

# COMPUTERWORLD

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NEWSPAPER

## NEWS IN BRIEF

### DPMA Questions CIA Proposal

PARK RIDGE, Ill. — "I feel we could accomplish what [the Computer Industry Association (CIA)] is after by working through the existing associations, but the associations would have to make some significant changes also."

That was the opinion of Edward J. Palmer, executive vice-president of the Data Processing Management Association (DPMA), on the subject of the new computer users group proposed by CIA. He spoke on the eve of DPMA's Info/Expo which will be held in Minneapolis, June 23-26.

"I can't see forming a new 'super group' when we're already overburdened with most of them," Palmer said. "But I would be in favor of restructuring current groups to work closer together to accomplish the aims of the proposed group."

Palmer said many of the aims as he understood them are in line with "some of the work we at DPMA will be doing if we get a favorable vote in Minneapolis on joining the American Federation of Information Processing Societies (Afips)."

DPMA has tried to stay on the management side of things, Palmer said, and

(Continued on Page 3)

### IBM 370/145 Memory Doubles to 2M Bytes

WHITE PLAINS, N.Y. — IBM doubled main memory capacity on the 370/145 last week through two new memory sizes: 1.5M bytes and 2M bytes. In making the announcement, IBM said the increase in storage capacity "may improve virtual storage processing efficiency by allowing users to keep more critical data ready for processing in main memory."

Monthly rental for a 145 with 1.5M bytes is \$27,280, and for 2M bytes, \$32,240.

Purchase price will be \$1,324,500 and \$1,569,300 respectively. First customer shipments and field upgrades of currently installed systems are scheduled to begin in the third quarter of this year.

### On the Inside This Week

Urban League MIS Plan  
Sparked by DPer on Loan —Page 6

Burroughs Fills In L Series  
With Six Mini-Based Units —Page 19

Communications .....15  
Computer Industry .....23  
Editorial .....8  
Education .....12  
Financial .....28  
Software/Services .....11  
Systems/Peripherals .....19

### With 'Dollars and Sense' Examples

## GAO Study Pinpoints Working CPE Tools

By Don Leavitt  
Of the CW Staff

WASHINGTON, D.C. — Users should be provided with comprehensive manufacturer-prepared guides containing information to aid them in obtaining increased efficiency from their systems.

That was one of the recommendations of a report on computer performance evaluation (CPE) tools and techniques prepared for Congress by the General Accounting Office (GAO) and now available to the general public for \$1/copy.

Spiced throughout with "dollars and sense" examples of savings actually attained by particular agencies, the 44-page document was prepared last winter and clearly triggered the formation of a CPE office within the General Services Administration (GSA) [CW, June 5, June 12].

GAO reviewed 43 computer installations in industry and government in preparation for this report, which is set up as a "how to" primer of the available tools and techniques. Working through a computer site point-by-point, it includes chapters on "ways to increase efficiency of application programs," "... of operating system software," etc.

#### Shows Why

Though it does not go into great detail of how the tools or techniques are used, the report shows why they should be used. Through a simple questionnaire, one federal agency eliminated 208 unnecessary reports, which represented 13% of the reports its users reviewed.

Goddard Space Flight Center was cited for using a software monitor and saving an estimated \$1.7 million in computer time annually, by improving a few key programs. The Defense Intelligence Agency, working from hardware monitors, changed an application program to obtain a 5% to 10% decrease in running time, the report noted.

"A large financial institution" estimated it saves \$211,000 annually in computer time, the report went on, by keeping its operating system properly tuned. Tuning

included assessment of which modules should be core-resident and which transient, and balanced use of I/O channels in handling the transient ones.

Other techniques to improve efficiency and cost-effectiveness included operator cross-training when more than one manufacturer's hardware was in-house, improved run-time documentation for operators (on 35mm slides, in one case), using independent peripherals instead of the mainframes' and program optimizers, GAO noted.

In view of the benefits many installations obtained from the use of these CPE

tools and techniques, GAO said, "More federal computer installations should be provided with more specific guidance on increasing computer efficiency."

GSA agreed and in a letter included in the report, deputy administrator Dwight Ink said GSA's Automated Data and Telecommunications Service (ADTS) will "require agency certification of [the agency's] having evaluated and improved the efficiency of existing systems when submitting requests... to price [new] systems." ADTS is the organization now setting up the GSA CPE office.

(Continued on Page 4)

## Delays, Errors Put Damper On Some Election Counts

By Edie Holmes  
Of the CW Staff

With November elections just five months away, local officials throughout the country are anxious to iron out problems encountered in computerized vote counts of recent primary elections. While computers were used in many

"... Our programmer ignored the system we had and devised a data base that does everything but sit up and bark... The overhead involved makes the time required to run many of its programs prohibitive."

areas to decrease the time between casting ballots and publishing election results, in some instances system errors caused delays, loss of money and frustration as county officials resorted to counting ballots by hand.

A three-and-a-half hour delay accompanied the Democratic Party primary returns in Jefferson County, Texas, last month, for example. A recount became necessary when it was discovered more

votes were counted than the number of people who went to the polls.

Whether the trouble belonged primarily to the NCR Century 100 used by the county, the IBM computer ballot cards punched by voters or the Computer Election Systems (CES) program employed to compile ballot results remains unclear, according to a Jefferson County spokesman.

"What is certain, though, is the need to devise a system that doesn't waste the taxpayers' \$53,000 spent each year to lease our present computer," he said.

#### Ran Out of Room

The tabulation process took an extra day in Clackamas County, Ore. Halfway through the election on a school district operating levy, officials discovered they had run out of room on the disk serving their Burroughs 3500.

"We noted the totals, cleared the disk and ran the other half of the election votes on the computer," said county election supervisor Norman Bass. After the election was over, a disk backup was

(Continued on Page 2)

### The Centralization Alternative — Part I

## 'Too Much Power' Too Hard to Handle

There are arguments to be made both for and against centralization of a large firm's computer power, but the benefits of a large-scale central data base are proving attractive, and advances in data communications make replacing a remote site's computer with a terminal a practical choice.

This series outlines the successes experienced by Jones and Laughlin Steel Co., which began centralizing several years ago, a decision that has already produced a significant reduction in mainframes and DP centers.

By Patrick Ward  
Of the CW Staff

PITTSBURGH, Pa. — Jones & Laughlin Steel Corp. (J&L) decided in 1969 that it had "just too much computer power" spread out in plants where it could not be used effectively.

So the company began a process of consolidating equipment within its plants, eliminating some DP centers and combining others in the Pittsburgh area into a single corporate computer center, said James Mages, director of management information systems for the firm.

By turning to larger computers, using terminals and improv-

ing its own mail service, J&L has already eliminated nine computer centers and cut its total number of mainframes from 25 to 14, Mages said.

J&L's latest centralization effort involves eventual replacement of seven IBM CPUs by dual HIS 6060 CPUs in the corporate computer center sharing 1.5M bytes of core storage.

The move "will significantly extend an already profitable centralization effort" and bring a centralized data base capability to the firm, commented James Paulos, vice-president finance and treasurer.

When the company began looking for new CPUs, J&L prepared a proposal with about 150 pages of specifications and questions and another 150 pages on the company's DP workload, Mages recalled.

IBM, Honeywell and Univac all recommended centralization, while Burroughs recommended a regional centralization approach, Mages said.

J&L benchmarked the competing CPUs with samples of its workload.

(Continued on Page 2)







## Chattanooga in Court to Defend Controversial 370 Installation

By Patrick Ward  
Of the CW Staff

CHATTANOOGA, Tenn. — This city will be forced to defend its controversial installation of an IBM 370/145 without open bidding [CW, Aug. 15] in court this week. Acting on their own, James Cardell, Honeywell (HIS) branch manager, and Lawrence Harwood, NCR branch manager, plus two other plaintiffs, have charged the move violates a city requirement for bids on any equipment costing more than \$1,000. They also claim the city's action deprived them of their right to earn a living.

But according to Gary Lander, special counsel for the city, there was no need for open bidding since the 370/145 is on lease and the municipal rule applies to purchases only. And this is a straight lease, not a lease/purchase agreement, he stated.

On the other hand, Arvin Reingold, attorney for the plaintiffs, contended the city's rule applies to leases as well as straight purchases.

### News Update

Cardell and Harwood said they asked to bid for a proposed replacement of the city's IBM 360/30 over a year ago, but were assured the city had no plans to put in a replacement without first taking such bids, since it had neither the legal right nor the authorized funds to do so.

City DP manager Howard Lewis said he could not say for sure whether HIS and NCR representatives were told ahead of time that the city planned to upgrade to a larger CPU.

Lewis said no Honeywell representative had called on him from 1968, when the city chose a 360/30, to 1973. And Lewis added he had never heard from the local NCR representative until that person heard the city was planning to put in a 370/145.

In the late summer of 1973 the city installed the machine as an interim system, paying \$14,734/mo on a 30-day lease.

Even though Chancellor Judge Hershel S. Franks ruled then that the city was not in a position to purchase the machine, he indicated the city could lease it because this would be a modification of the city's contract with IBM for the 360/30, and not a new contract, Lewis stated.

But according to Reingold, the city referred back to the 1964 contract giving IBM continuing authorization to supply keypunches and other equipment. The judge may also have decided to let the city keep using the 145 because it was already installed, Reingold mentioned.

The judge's ruling still prevents the city from purchasing the 145, Lander noted. DP manager Lewis, who said the city would do better economically to purchase the machine, mentioned the city is

accruing purchase credits on the computer.

The plaintiffs have argued that the credits, and the fact the system was already installed, would favor IBM in the event the city did choose to take bids and purchase a computer system.

Since installing the computer, the city has acquired 10 IBM 3270 displays and an IBM 3705 communications controller through open bidding with the agreement of the plaintiffs, Lander noted. Only IBM responded.

The city has received a consultant's report, commissioned after the installation of the machine, which stated the decision to upgrade from the 360/30 was "timely and appropriate," and that "the 370/145 provided the most realistic and efficient way to make this transition."

The 370/145 will be able to meet city needs for at least the next five years, the study predicted.

## TLMS-TAPE LIBRARY MANAGEMENT SYSTEM

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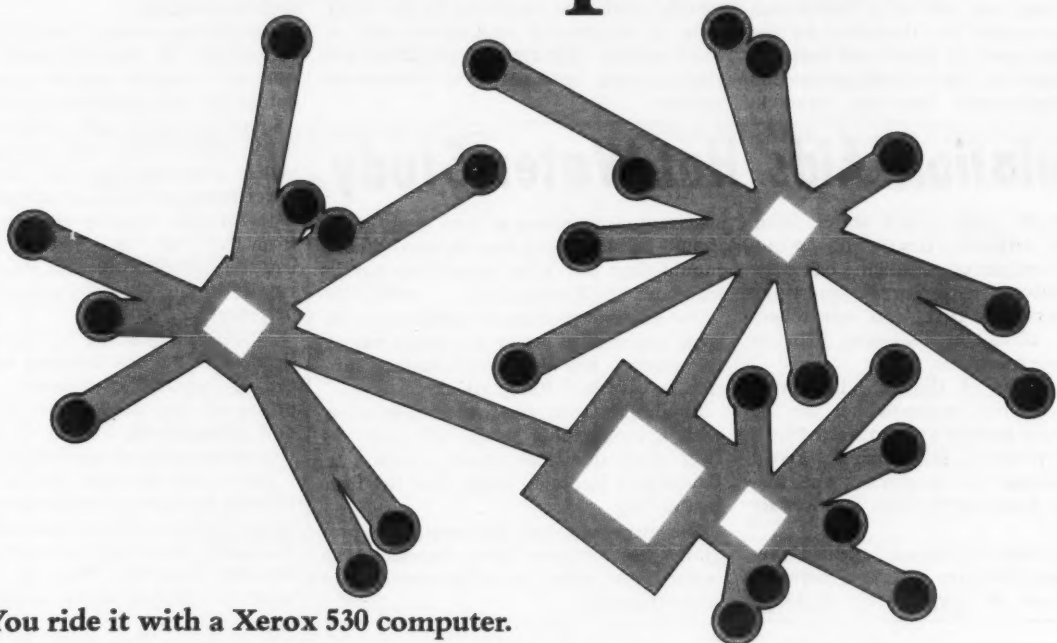
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## DPMA Officials Doubt Need for 'Super Group'

(Continued from Page 1)

therefore cannot be compared to groups such as Common or Share or a vendor group. But DPMA is getting more involved in trying to develop positions on privacy and standards, he noted.

Herbert B. Safford, immediate past president of DPMA, stated he would not support a user group of the type CIA proposed, but said DPMA should support groups like Common or Share which truly address user needs.

Safford also expressed concern that a new group supported by existing associations might "dilute" the projects and educational programs supported by DPMA and others to the point where their effectiveness would be nil.



## Federal Data Bank Uses Decried

CAMBRIDGE, Mass. — Personal freedoms are being threatened by indiscriminate governmental use of information about individuals gathered from computer-based data banks and electronic surveillance techniques, said Jerome Wiesner, president of MIT and science advisor to Presidents John Kennedy and Lyndon Johnson at recent commencement exercises.

He said Watergate was only "symptomatic of more pervasive information problems" compounded by "the expanding use of data bank and electronic intercept devices."

"If, through electronic means, access could be gained to computer memories such as those in the IRS, the Social Security system, the FBI, credit bureaus and other agencies — and that information be used to intimidate individuals — a powerful weapon for subversion exists," he warned.

Calling to mind that testimony presented before Sen. Sam Ervin's (D-N.C.) Constitutional Rights Subcommittee in 1971 revealed wide-

spread collection of information against antiwar organizers, speakers and demonstrators, he reminded attendees that "modern technology has produced a subtle shift in the balance of power that the Constitution deliberately established between individual and state, and was now providing the state more power than was safe."

"The Bill of Rights has, to an unknown degree, been undercut by new information technology and it must be repaired by legislation," Wiesner stated.

Availing that it is "unlikely" for new technology to undo the damage, he said "further legislation is required to protect our rights from self-righteous government... and our citizens from intrusions into their private lives."

He called on the graduates to use their special understanding of technology and apply it to the political and social problems to help "repair the shaky foundation on which our democracy now stands."

## ACLU, Parents Ask Restructuring Of Data System for Handicapped

By Edie Holmes  
Of the CW Staff

ANNAPOLIS, Md. — In response to pressure from the American Civil Liberties Union, parents and education professionals, the Data System for the Handicapped (DSH) here is considering a change in its data base from categorization by individual child records to the kinds of services needed by and rendered for children.

Proposed by the Maryland State Teachers Association, this change in the organization of the DSH data base "would meet most ACLU and parent objections and ease DSH apprehensions concerning the protection of the rights of children served by state programs for the handicapped," DSH director Richard E. White said.

Organized in 1971 by six state agencies concerned with evaluating and planning programs for children described broadly as "handicapped," DSH was designed to study Maryland efforts in this area. The

system has undergone three revisions of form and format since then, and is preparing to begin another.

"We are forming a task force with the express purpose of getting away from categorization of data on the basis of individual records and have asked the ACLU to participate," White said.

### ACLU Protest

The ACLU resigned from the advisory board of DSH two months ago in protest of DSH's failure to change the organization of its data base despite repeated protests from parents and teachers.

"While we understand and support the statistical needs of an organization designed to pool state information on programs for the handicapped, we fail to see why any system exists on the basis of individually identifiable and recallable materials," commented John Roemer, representative for the ACLU.

Arguing that some traceable form of a child's individual records remains in school files, and that not all records are safely locked up in the computer, Roemer said the ACLU has continued to make recommendations to DSH and is encouraged by the organization's interest in the teachers association proposal.

From the ACLU's viewpoint, issues involved in the data reorganization involve the need for consent from parents to the inclusion of their children in such a system, the safeguarding of record confidentiality and the potential harm brought about to children identified and classified as "sick people."

### Records Destroyed

Speaking for DSH, White claimed the system does have safeguards protecting the rights of children. "A Soundex code system prevents any individual child from being identified," he said. "Individual records are identified only for correction and updating purposes, and all records are destroyed once a child has left a program."

"We feel the ACLU misunderstood the size and capability of DSH," White continued. Apparently a small staff and a modest computer make changes to the system possible only once a year. DSH operates on a Honeywell 115 with 32K, one disk, six tapes, a single job stream and no off-line terminals or inquiry, according to White.

Despite disagreements and misunderstandings between the ACLU and his organization, White welcomes the union's recommendations and agrees "a program like DSH should be closely supervised."

He looks forward to the possibilities of a system organized on the basis of the service needs of children. "Success with the system means the availability of hard data to convince local agencies for the handicapped of the staffing and program needs of kids," he said.

## GAO Study Pinpoints Working CPE Tools

(Continued from Page 1)

In nearly identical language, Ink said Office of Management and Budget (OMB) circular A-54 is being revised to reemphasize that agency managements "must evaluate existing systems and make efforts to improve the efficiency of such systems prior to procuring additional or more powerful ones."

To which an independent CPE consultant could only add, "That advice goes double for installations outside the government."

Copies of the report can be ordered from GAO, P.O. Box 1020, Washington, D.C. 20013. Requests must include the publication number (B-115369), date (June 3, 1974) and payment in full, a GAO spokesman noted.

## N.J. Unemployment Insurance Program

## DP System Linked to State's \$30 Million Deficit

NEWARK, N.J. — A \$30 million deficit uncovered last year in the state's unemployment insurance program appears linked to a computer system implemented in the '60s when unemployment was very low, according to a study made by a New York accounting firm.

The finding was part of a four-month survey contracted last December by the state Department of Labor and Industry to investigate the cause of billing errors in the unemployment insurance fund in

1971, 1972 and 1973. The study was completed last month by Coopers & Lybrand.

Planned to process 70,000 claimants each week, the department's two Univac 70/45s couldn't handle the 140,000 persons who flooded unemployment offices weekly with the recession in the early '70s, a department spokesman said. A hand system requiring keypunching was implemented to assist the automated system.

Failure to interface these systems properly, however, resulted in \$100 million being paid to jobless workers but billed to the wrong business and industrial employers required to contribute to the fund, the spokesman continued. He estimated the fund lost \$30 million through such underbilling.

Underbilling resulted when information concerning an unemployment payment was not charged against employers to determine their contribution rates.

Some employers with a high experience of unemployment, who normally pay a higher premium, actually were paying lower rates, the spokesman said. The current formula requires employers to pay from 1.3% to 5.6% of each employee's base pay of \$4,200, with the percentage based on the firm's unemployment experience.

Conclusions reached by the accounting firm indicated no criminal wrongdoing, the spokesman commented, but have prompted the department to initiate a new management control system for the Unemployment Insurance Program.

These controls may involve computer training for some of the department's 400 employees at an estimated total cost of \$120,000, in addition to a new computer, an IBM 370/135. Plans are also under way to institute more reliable backup systems, he said.

Department Commissioner Joseph A. Hoffman claims steps have been taken since late last year to minimize and correct billing errors.

"Through improved controls and extra processing, we have been able to charge about one quarter of the \$100 million to employers, and their contribution rates will reflect these changes," he said. "We are also developing methods for properly charging the balance of uncharged payments that occurred in 1973."

### Worth the Cost?

Hoffman cautioned, however, that the retrieval of uncharged payments from 1971 and 1972 may not be worth the cost required to go through the morass of unemployment insurance fund paperwork.

In his opinion, the unemployment fund is dwindling to a "perilous condition," with continuing unemployment depleting the fund to \$34 million as of May 1. At the end of last year, the figure was \$140 million, and according to national studies, should approximate \$500 million.

Proposals now before the state legislature would require workers and employers to contribute more money to bolster the fund, Hoffman noted.

## Simulation Aids Hot Water Study

LA JOLLA, Calif. — Hot water from beneath the earth may one day power our televisions and air conditioners, but only if some serious environmental questions can be answered first, and researchers here are calling on computer help to answer those questions.

"Certain areas of the U.S. have vast reservoirs of hot water which can be raised to the surface and converted into electrical power," said Dr. T. David Riney, manager of geophysics and materials for Systems, Science & Software here.

Working under a National Science Foundation grant, the firm will run simulation programs on its own Univac 1108 to

answer such questions as How many wells should be placed in a specific area? Where should they go? What should the pumping rates be? Riney stated.

One possible problem is subsidence. "If large amounts of water are taken out of the ground, will the earth's surface subside, or cave in?" Riney asked.

Simulation programs, in conjunction with a topographic survey will help answer these questions about a region in California's Imperial Valley that the firm is studying.

The firm will also use computer programs to evaluate how removing the water could affect an area's vulnerability to earthquakes.

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**The second step** was to think of the Interdata 7/32 in terms of its advantages to a particular application.

**The third step** was to remember that the 7/32 has a main memory expandable up to a million bytes — and direct addressing up to 16 million bytes. Which is pretty significant when you consider that memory costs are coming down causing a demand for bigger memory, larger programs and even larger addressing capabilities.

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A VANTAGE

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City: SPRINGFIELD, ILL. Zip: 62761  
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**Official Entry Blank Interdata 7/32 Ad Contest**

**Layout:**

**Headline:**

THIS MINI IS NO MOUSE

**Copy Points:**

Summary of 7/32 features  
compared to 16-bit minis.

Name: William L. Westlake, JR., Pres. Mgr. Computer Products  
Company: Data Dm Inc.  
Address: 694 W. Maude Ave.  
City: Sunnyvale, CA Zip: 94086  
Telephone: 408-732-7330

Interdata Inc. has my permission to use this contest entry in their trade  
advertising. Signed: William L. Westlake, JR. Date: 5-1-74

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**Official Entry Blank Interdata 7/32 Ad Contest**

**Layout:**

HEADLINE

CARTOON DRAWING OF  
PROGRAMMER THINKING ABOUT  
LARGE SOFTWARE DOCUMENTS  
LABELLED 10K, 10K ETC. AND  
ALSO THINKING ABOUT A PICTURE  
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FIRST 7000  
COPY LINES

**Copy Points:**

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FROM DELUSION OF GRANDEUR,  
IS THINKING ABOUT FITTING MILLIONS  
OF BYTES OF CODE INTO DIRECT ACCESS  
MEMORY. HE'S JUST THINKING ABOUT  
INTERDATA'S NEW MEGAMINI 7/32  
PROCESSOR. (CONTINUE WITH  
HARD SELL.)

Name: BRUCE A. ALLENHORN, JR., ENGINEERING PROGRAMMER  
Company: M.B. GRAPHIC SYSTEMS - JPD  
Address: 2735 CURTIS ST.  
City: DOWNERS GROVE, ILL. Zip: 60515  
Telephone: 312-963-4600

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## Decentralized Management

# Two DPers on Loan Spark Urban League's MIS Plan

By Nancy French  
Of the CW Staff

NEW YORK — "As a professional corporate entity engaged in serving people, we have a responsibility to perform as well as any industry," said National Urban League executive director Vernon E. Jordan Jr.

It was for this reason that the league went to big business to find the expertise it needed to develop a new management information system to maintain tighter control of its \$20 million annual operation.

It sought help and got it from the First National City Bank, which loaned Willis I. Else, vice-president of its real estate industries division, and the J.C. Penney Co., which loaned Thomas F. O'Rourke, its senior systems analyst, both at full salary.

Their goal: a management information system combining the principles of a computer information system with decentralized management.

### Widespread Organization

As the nation's largest predominantly black civil rights and social service agency, the Urban League employs 2,500 professionals in 102 local Urban Leagues across the country and is served by 25,000 volunteers. It has five regional offices, a Washington bureau, and a research department and national headquarters here.

To direct this far-flung operation, Else said he set out to create a management information system with incentives that would encourage middle managers "to serve agency goals" rather than concentrating exclusively on the operations of their own particular departments.

Else quickly pulled together a seven-member team to study departmental decision-making to determine just what information managers needed to make knowledgeable decisions.

### Nine Systems Emerged

Nine different management information systems emerged. They concerned budgeting, personnel records, payroll, accounts payable, general ledger, funding long- and medium-range planning and program development.

Else next designed and implemented the management information system, determining the type, content and timing of reports that would go to each manager, and established procedures for gathering the information that would be contained in them.

O'Rourke then stepped in to select the computer that would best suit the league's needs.

O'Rourke recommended an IBM System/3 Model 10 to handle personnel, funding, accounts payable, general ledger and payroll. Future plans include automating the league's local affiliate reporting system, the budgeting system and a furniture and equipment inventory to calculate depreciation for the league's accountants.

### Helps Middle Managers

The new MIS has allowed tighter control of the league's budget and greater accountability to funding sources. Most important, according to John

Watkins, a league spokesman, "it has made decentralized management possible — by providing middle managers with up-to-date, accurate information on which to base decisions."

Improved affiliate reporting and participation in league planning will give the national office more accurate research on the needs of 102 league communities and what to do about them. In turn, comparative reports of affiliate activity should create incentives for more effective local

league performance, Watkins said.

Among the league's activities are programs aimed at recruiting and training minority members for law enforcement careers, and giving family planning advice and running an exchange program between successful black executives and black colleges. It also maintains a national skills bank for businessmen looking for black talent, runs citizenship and registration programs and serves as an advocate for the

poor before Congress and federal agencies.

*"[MIS] has made decentralized management possible — by providing middle managers with up-to-date, accurate information on which to base decisions."*

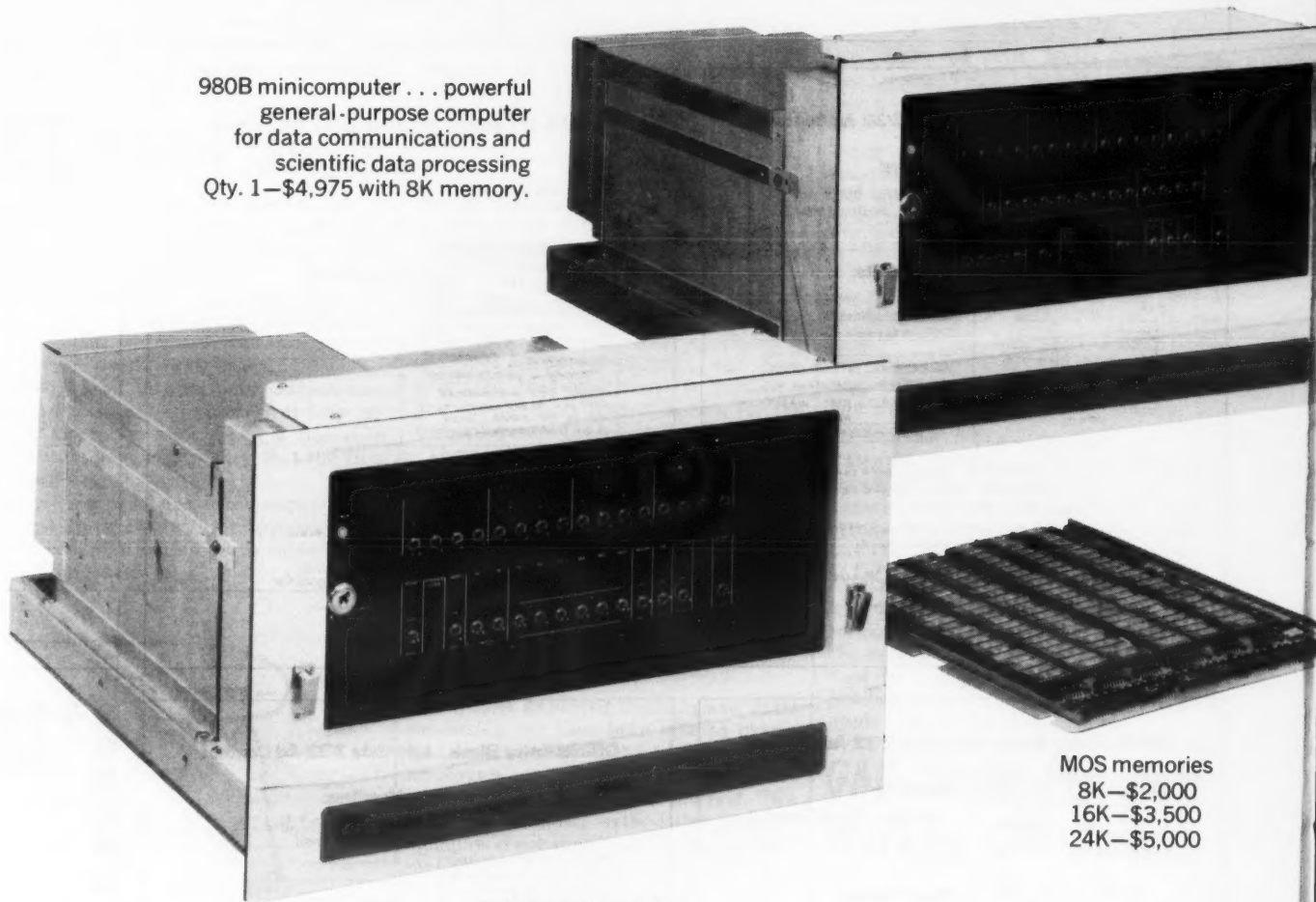
The league's educational programs have resulted in alternative schools in nine cities to educate and graduate young people who dropped out of the local

school systems. The league studies housing problems and has provided seed money and technical assistance to local Urban Leagues in Grand Rapids, Mich., and Phoenix, Ariz., for example, for low-cost housing projects.

As for industry-league cooperation, the league is committed to it. "We need each other, and the country needs our cooperation if its citizens are to prosper to the fullest social and moral extent," Jordan said.

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## Banks Urged to Adopt EFTS... Fast

ST. GEORGE, Utah — "Banks must stop merely talking about the Electronic Funds Transfer System (EFTS) and do something if they expect to stay ahead of thrift institutions which already have made significant inroads in automation techniques," the president-elect of the American Bankers Association (ABA) said here recently.

George L. Whyel, who is also vice-chairman of the board of the Genesee Merchants Bank and Trust Co. of Flint, Mich., said, "Thrift institutions have served warning that they will not sit idly by waiting for us to decide whether or when we will enter the field."

The cited as evidence the experiment being tried in Nebraska by the First Federal Savings and Loan Association of Lincoln and the Hinky Dinky supermarket chain [CW, Feb. 13] that is

tapping "a new source of deposits — deposits that might have gone to local banks."

He told the Utah Bankers Association meeting theoretical arguments about implementing EFTS are important, but it is also vital that bankers "look around and see what we must do to protect and increase our share of the market by laying the groundwork for EFTS."

Since granting all financial institutions direct access on equal terms to automated clearinghouses would be the first step in granting all financial institutions the power to offer checking accounts, and since thrifts have given no indication of any willingness to relinquish any of their special privileges in the areas of deposit interest rates and reserves, "banks must oppose thrift institution efforts to win direct equal access to . . . clearinghouses," he concluded.

## He Was 'Snowed Badly' By DP Training Institute

By Patrick Ward

Of the CW Staff

BOSTON — Tom Buchan, 24, got out of the Air Force in the spring of 1973 and almost immediately went to school to learn how to be a computer programmer.

A year later, after spending \$1,660 in tuition, he is working as a clerk.

Buchan had thought it was odd that he could start an academic program in April, but officials at Career Training Institute (CTI) assured him there were no class

groupings in keeping with the school's policy of individualized instruction.

"Before I signed up they . . . told me how great my training was going to be, how I was going to have expert teachers, loads of time actually working with the computers and how I was sure to wind up getting a good job," Buchan recalled in a *Boston Globe* article related to its recent investigation of for-profit vocational schools [CW, April 17, June 12].

"I really feel stupid I could have been snowed so badly."

His diploma, in the name of the Andover Institute of Boston with which CTI had merged, certifies Buchan had "satisfactorily completed the prescribed course of training, classroom lectures and practice in computer operations/computer programming."

The Andover Institute of Business in Boston, the *Globe* pointed out, is not related to the Andover School of Business in Andover, Mass.

### 'No Final Exam'

The diploma's wording is off on several counts, Buchan said. His course dealt with programming, with no instruction on computer operations. As for "satisfactorily completing the course," Buchan said he never took a final exam, and if he had, "it would have shown I didn't know half the material I was supposed to."

The school's training, he said, consisted of the students listening to tape recordings on computer programming while reading programming manuals. No one took attendance.

"It was no way to study any subject like that," he commented. "It was like studying on your own in any library."

### Nobody To Turn To

Buchan had been told there would always be a qualified instructor on hand to supervise the students listening to tapes, but halfway through his course, the instructor was sent out for half the day to teach another DP course, he said.

"We were left all by ourselves. If we had a problem or a question, there was nobody to turn to," Buchan recalled.

There was no computer at CTI, Buchan said. The school rented time on a marketing company's IBM 360 across town.

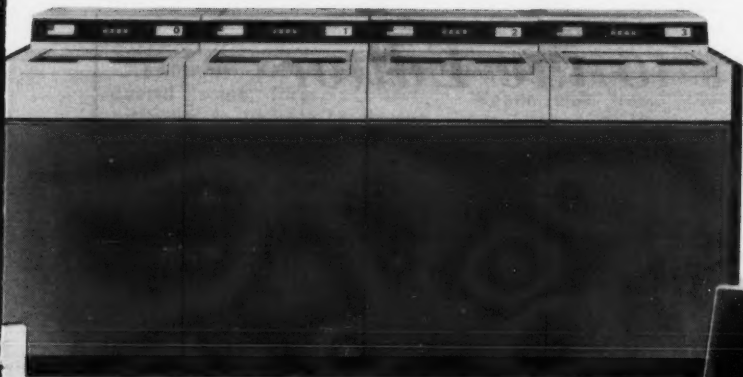
### 'Worst Day'

Students in Buchan's course were supposed to have access to the computer from 11 a.m. to 1 p.m. on Friday, "which was the worst day of the week since they were doing payroll," Buchan remembered.

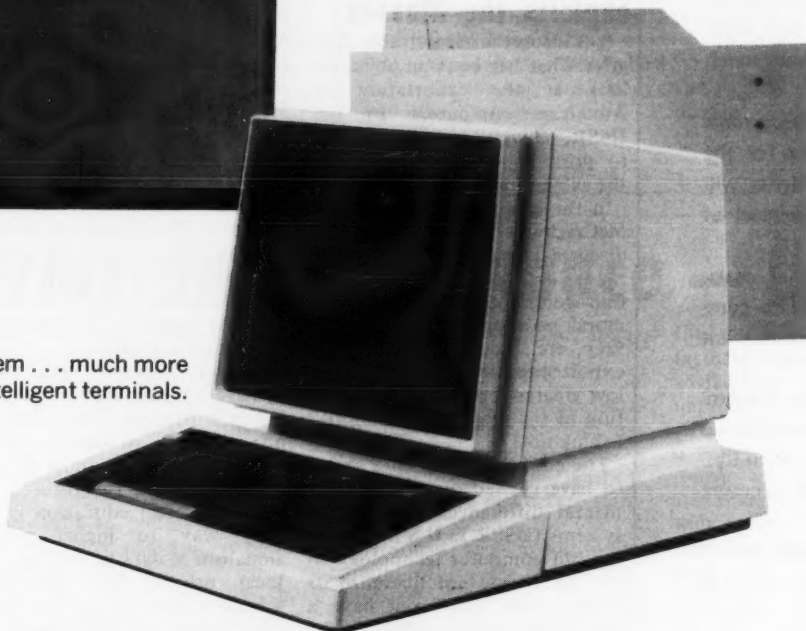
"We often never got it until 11:30 or 12:30," he said.

The students put in cards for a compile and that was it, he stated. In his year-long course, Buchan said he had three programs compiled and no executions.

Although his present clerical job is unrelated to DP, Buchan said he is still interested in working with computers and would like to go back to school to study the subject once more.



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**TEXAS INSTRUMENTS**  
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## Editorials

### A Welcome Performance

The dearth of statistical guidelines on what makes up an effective DP installation may be one of the key factors in holding back DP efficiency.

Therefore it is welcome news that the world's largest computer user — the Federal Government — is going to try to develop such guidelines and share them with the general computer user [CW, June 12].

With a large base of different computer systems and workloads, the General Services Administration's new computer performance evaluation office should be able to develop some statistical norms for efficiency.

And through its evaluation of these many different types of systems, the office will probably be able to come up with many "tips" or operating procedures that mark particularly efficient installations.

By applying these operating procedures, the average shop should be able to improve its efficiency, and by using the statistical measures, every DP shop should be able to see how it is doing in the area of efficiency.

Hopefully this will allow all users to get the maximum performance out of their equipment and will make upgrading a logical, not emotional, procedure.

### Learning to Share

Most governmental computer applications are common to all state and local governments, but to date most governments have developed applications without much "cross-pollination."

While one state or city might have perfectly acceptable systems for payroll or police applications or for the courts, most other state and local governments will develop their own systems for these jobs instead of adapting existing programs to their needs.

This results in duplication of effort, higher costs, higher taxes and a general disenchantment with computer applications in the state and local government areas.

Two groups are attacking this problem — the Government Management Information Sciences Users Group and the National Association of State Information Systems — and while there have been some initial successes, the record is largely one of failure.

All state and local government users, however, owe it to the taxpayers who ultimately pay their bills to try to improve the record in this area.

Sharing of programs can reduce DP costs in almost every area and it is particularly important that governmental agencies supported by public funds take advantage of every money-saving idea available.

### Minicobol, Now!

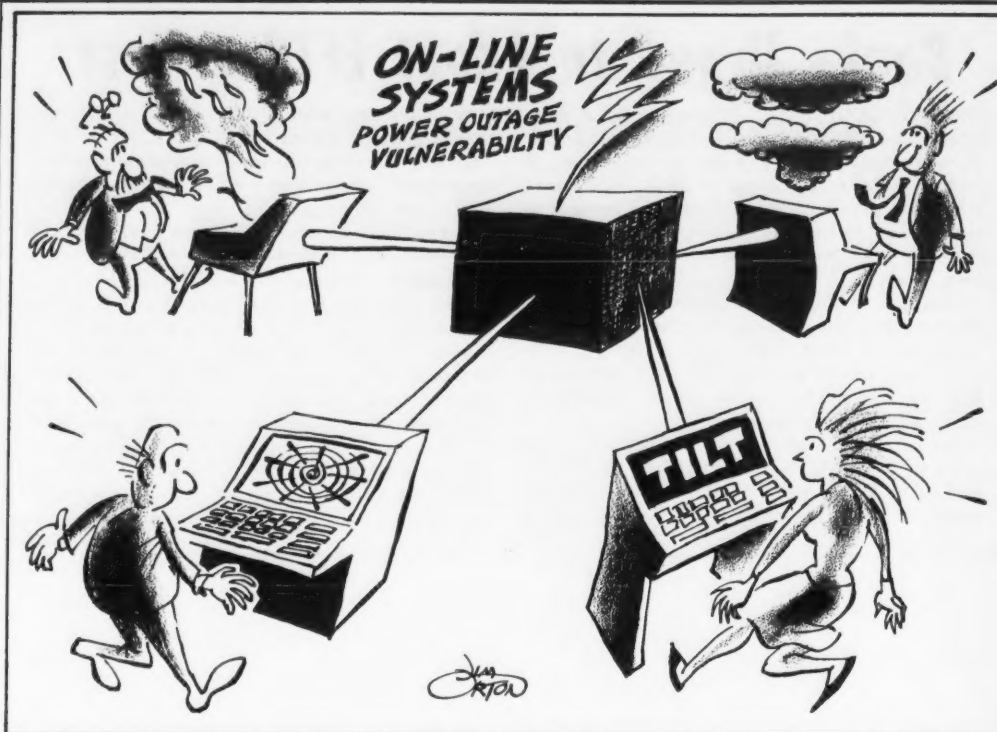
Users yearning for Cobol for Digital Equipment mini-computers grow in number every day, but DEC has postponed offering Cobol month after month, year after year.

DEC presently owns marketing rights to an Australian Cobol processor that runs on a 16K PDP-11 [CW, March 27] ... and recently at the Decus meeting in Boston, Capt. Grace Hopper gave DEC Vice-President Gordon Bell a four-in. thick stack of documentation, verification routines and standards for Minicobol that her group in the U.S. Navy has compiled.

True, Minicobol is just an abbreviated subset of Cobol, but Hopper reported that one of the Navy DP centers in Maine had converted to Minicobol with initial trepidation but with eventual and enthusiastic success.

One way or the other, Cobol for the mini is here.

The real question is: When will DEC catch up to the needs of its business-oriented users by making Cobol available?



Note in the Eye of Progress

## Letters to the Editor

### Exporting Computers Exploits the Masses

It is altogether regrettable that after what has been an objective look at the exportation of American computers to the USSR, *Computerworld* saw fit to print an asinine cartoon on the subject in the June 5 edition.

In the same edition, Daniel D. McCracken's excellent article discusses the denial of essential rights on the domestic scene. Can we reasonably then take the moral position of guarding privacy, etc., domestically and yet export the very tools which allow greater control and exploitation of the masses in the USSR? I think not!

The euphoria of detente seems to have glossed over the fundamental differences in our two systems (USSR vs U.S.). Exporting our computer technology to the USSR will not liberalize its system, but may well have a long-range negative effect on the personal freedom of the people. The Orwellian concept of complete control will become technically possible.

L.G. Rogers

St. Louis, Mo.

### Local DP School to Be Best Training Source

Regarding the article by Joseph T. Rigo titled "At Last... A Few Good Words on Private DP Schools" in the May 8 issue of *Computerworld*: Rigo did say a few good words but a few more could be said and even a fact or two.

Rigo stated that private DP schools accept students who can't do the work and who have high dropout rates. One school I know of here in the Chicago area is placing over 80% of its graduates and the employers are happy with the students. The school has a dropout rate of around 6% in its programming course. The school has a testing program that is not easy and requirements that end up turning away about 60% of those who take the tests.

In the past few years public pressure has brought about extensive change in the Midwest.

Here in Illinois the Department of Public Instruction has been very active. The Federal Government has also added its voice and pressure in closing schools and promoting improvement. This, together with controls developed by the schools themselves, has brought about an unbelievable change.

The school mentioned above is just one. Others also have fine records. The private DP school business like all new and evolving businesses is just now learning how to teach data processing and make a profit.

Rigo said private schools seem to have a legitimate role to play in our profession. Private schools not only seem to but now do fill a role which is to train the DP professionals of the future.

I deeply feel education is the only way to higher professionalism in data processing. The local private data processing school is now or will be in the near future the best source for current, exact training for DP professionals.

Robert E. Sennet  
Streamwood, Ill.

### Security 'Test' Needed

Surely those who want to punish students who break their "security systems" are wrong [CW, May 22]. A security system that is not safe from students is scarcely likely to be safe from professional criminals, spies or saboteurs.

Would it not be better to give credit for breaking the system, so that deficiencies can be brought to light and corrected before harm is done? Universities can thus render a valuable continuing service to the community and to their students who by reason of their experiences will be well-placed to recognize actual and potential weaknesses in those DP systems.

D. Ibbetson

Toronto, Ont.

### 'One' Can Do Anything

I simply want to formally concur with the opinion by Frances Smyth in her Viewpoint of May 22. Having worked in environments from government to in-

dependent consultant, I have always felt the artificial stratification of responsibility in our field has been detrimental.

Simply put, why introduce communications and all its attendant problems so that five people can do a job, when for a fraction of the cost, you can get the job done better with one good person who will, by definition, have the perspective of the whole problem all the time.

Let me close with a caricature of this idea:

A secretary rushes into her boss' office with the announcement that Lindbergh has made a solo flight across the Atlantic. No reaction. She repeats her "scoop." Still no reaction. After her third attempt with great exasperation, he looks up and says: "Miss Jones, what you have told me is not news. One man can do anything he wants to do. When a committee makes a solo flight across the Atlantic, that's news!"

Marvin Ginsburg

Washington, D.C.

### Judge Never Said It

I would like to correct for the record a serious error that appeared in a May 1 *Computerworld* article on a Superior Court hearing in San Jose, Calif. concerning a trade secret theft case in which IBM was the victim.

The article attributes certain remarks to Judge Peter Anello which the court record shows were never made. Anello did not, as the article reported, criticize either the district attorney's office or IBM when dismissing the charges against one of the defendants, nor did he indicate the defendant might "have a case against IBM."

E.F. Rodgers

Communications Manager

IBM  
San Jose, Calif.

The record stands corrected.  
Ed.

*Computerworld* welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.



## Private Schools Stress Practical DP Training

By David J. Aber

Special to Computerworld

I read "DP Education: Acute Crisis" which appeared in the May 8 issue of *Computerworld*, which quoted Gopal K. Kapur.

I agree with Kapur's views until his comments were quoted concerning college training and DP schools.

Kapur stresses that colleges and universities are the best means of producing well-qualified DP professionals, but that these "pillars of education" don't involve

### Rebuttal

themselves in the development of business data processing. Since industry is still in the "application world" how then can these people be the best prepared?

Also, Kapur asserts that private DP schools emphasize theory and not practical applications.

Some schools are quite the contrary!

Apparently Kapur has conducted some form of fact-gathering to be able to present himself in front of the NCC to speak on DP education. I don't believe the facts Kapur is presenting are a true picture of all DP schools.

"Theory training" should be left to the colleges and universities (where it has been), and the way the universities are graduating graduates, it appears they

will always train with "theory" as their mainstream of training.

Kapur would be quite shocked to learn that we train on an average of 100 to 150 college graduates each year as computer programmers, because their "alma mater" hasn't taught them the difference between a file maintenance and a stock status report. Industry wants programmers who know the accounting cycle rather than how the software for the square root routine was written.

Our students are trained in Ansi-Cobol, RPG, Fortran IV (from the practical approach) and Basic Assembler. They are required to write programs involving banking, inventory control and general accounting applications.

They are also required to take a systems analyst course involving CICS, MIS and systems design to prepare them for the real world.

Isn't it ironic that most colleges and universities in our area don't teach a systems course?

Kapur also stated the data processing community should help to upgrade the education available in DP schools. Hold on to your hat, Kapur. More industries have come to our institute to help upgrade "their training requirements and personal evaluations," rather than us going to them.

I am sure Kapur has found  
(Continued on Page 10)

## Tokyo

The cult of productivity, of technology, of television and jet transportation and advertising is worldwide. One sees it struggling to be born in Yugoslavia, flourishing in Italy, mixing with conservatism in England; corroding the quality of life in New York and Los Angeles. But to see it at its absolute peak, wild, still almost unquestioned as a way to happiness — come to Tokyo!

Computer use is growing at the rate of at least 25% a year. Everything we talk of in the U.S. is being tried here, and many of our wildest dreams are commonplace. I called yesterday at NTT, Nippon Telegraph and Telephone Public Corp., like the Bell System without Western Electric. They calmly showed me push-button phone home computation services, with a whole library of simple programs for arithmetic, trigonometry (surveying) and so on. Voice output, recorded by a famous female radio star!

Ike Auerbach predicted this sort of service in his recent Sydney speech. It has been available and in use in Tokyo from the earliest subscriber use of 12-button phones — three years ago! What a country!

A very lovely young lady also demonstrated a complex golf-players improvement game for me. Among other things it recommended club length and weight, metric, of course, for each of the 13 clubs I should carry. Inputs included my age — gasps of simulated disbelief — and my average drive (in yards!!). I assumed the pretty demonstrator was what the Brunel chaps called a "booth bird."

On the way out I recognized a model of the "sunshine rights" calculation we de-

scribed as a Japanese novelty on the front page of *Computerworld* last summer [CW, Aug. 22]. To program that job, one had to know Japanese real estate law, surveying, solid analytic geometry and trigonometry, and some astronomy (position of the sun as a function of latitude, time of day and date). My host, Mr. Shirane, deputy director of the Data Communications Bureau, then reduced me to goggle-eyed silence by telling me the whole thing had been programmed by Miss Demonstrator! Ah so!!

I collected material for literally dozens of columns and editorials and speeches in three days of intensive visits. I met old friends and made many new ones. I did a six-hour seminar, overbooked by 40%, with a very expert translator who had "done" me once in Washington and once before in Japan. I met the heads of the Fujitsu Computer and Univac operations, and was also enormously impressed by NTT and Hitachi. What a week!



Herb Gronk

## Contract Terms on Maintenance — Unfair to User?

John Gamble, treasurer of a small Burroughs shop from Saratoga Springs, N.Y., recently talked to me about the standard terms the Burroughs Corp. currently offers with its computers. He was wondering whether they were really professionally proper, when a user has an extensive amount of downtime. After looking over the contract, I must admit I am wondering about it also.

The current terms concerned call for Burroughs not to be liable to the customer for delays in maintaining the equipment for any reason. This worries Gamble, because his experience is that the Burroughs equipment

they have on rental has sufficiently severe downtime, and his firm is buying thousands of dollars worth of machine time outside to make up for the lost time. As far as he can see it, agreement to such contract terms would effectively permit Burroughs to collect rent on a system which could never be relied upon to work.

I must admit this is the way I read the contract also. True, it is possible that some of the differences between the new Burroughs contract with this total exclusion of responsibility clause, and the old one (which only lifts responsibility from Burroughs for "damages caused in rendering of repair hereunder," when the damages are caused as a result of something beyond Burroughs' reasonable control) are not as large as they currently appear to be on the surface.

The new phrasing may in fact more accurately denote the true situation, no matter how much

lawyers may find to argue about.

### User Powerlessness

All illustration of the comparative powerlessness of the user when maintenance is taking a long time occurred apparently at Gamble's place just before Memorial Day.

There had been a continuing amount of trouble, and on the Thursday afternoon, President Don Castor told me he received a phone call from Burroughs saying they would like to come in the next day, half-an-hour early, at 6:30 a.m., "to do more extensive preventive maintenance (PM)."

Castor agreed to this, and the next thing he knew, at 7:05 the next morning he received another call from the Burroughs' people saying they had some "bad news" for him. They had not apparently been doing PM at all — but had been disconnecting tapes and a disk — and taking them out of the computer room.

Which gave Castor a problem. He could, of course, order them out of the room — but what good would that do. With the way the system was behaving that would lead to a standoff, with the machine sitting without necessary maintenance. If he let them in, then he feared the maintenance men could, under Burroughs' interpretation of the current contract, power down the system while pretending to do maintenance.

In either case, Castor would be unable to service his customers, and would soon be out of business.

Burroughs believes some of

the customer's statements are factually inaccurate, but on the advice of its legal department, is unprepared to identify any specific inaccuracy, or to say what it believes really happened. Burroughs also declined to provide any reasons why it required the wide protection which is included in the new (1972) contract.

So, there is the problem. Are the contract terms currently offered by Burroughs really fair to the user? (Other manufacturers' terms are fairly similar to Bur-

roughs'). Perhaps this is one of the things that a real group of independent computer users, funded perhaps with the CIA's \$50,000, could approach without having to force some poor user to risk going out of business in order to get it settled. What do you think?

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### The Taylor Report

By

Alan Taylor, CDP



#### Old Contract

##### 8. Damages

a. Lessor shall not be liable for any damages caused by delay in delivery. Lessor shall not be liable for any damages caused in rendering of repair hereunder, arising from any cause beyond Lessor's reasonable control. Lessor shall not in any event be liable for indirect or consequential damages.

#### New Contract

C. Burroughs warranty as stated in paragraph 10 of this agreement and maintenance coverage does not include any assumption by Burroughs of liability (1) for any loss or damage caused by delays in the rendering of equipment maintenance hereunder for any reason.

The two sets of contract terms, one from the old contract — a 1971 one — and one from the newly offered contract are shown above. The difference appears to be that Burroughs, while charging for maintenance, is exempted from responsibility if the maintenance is delayed.

## Are Contract Terms Reasonable?

(1) One standard contract now being offered for maintenance absolves the vendor from all risks with regard to maintenance. Is this reasonable? Yes ( ) No ( )

Why? \_\_\_\_\_

(2) Do you think that technicians entering to perform "maintenance" should disconnect or remove equipment? Yes ( ) No ( )

Why? \_\_\_\_\_

(3) Do you think that trying to get these matters resolved would be a worthwhile operation for an independent computer users group? Yes ( ) No ( )

Why? \_\_\_\_\_

Would you be interested in belonging to such a group if one was formed? Yes ( ) No ( )

Name \_\_\_\_\_

Title \_\_\_\_\_

Address \_\_\_\_\_

After completion please return to Alan Taylor, c/o *Computerworld*, 797 Washington Street, Newton, Mass. 02160.



# The 'Sky Falls Down' on Those Who Rise Too High

By Miles Benson

Special to Computerworld

Whenever I hear the old saying, "The sky is falling," I can't help but remember my old computing colleague "Plucky" Bigg.

Plucky was one of computing's first examples of the Peter Principle. When he was a practicing technologist, his programs hummed like a rotary engine. He was quick, accurate and thorough. On a programming practitioner scale of 10, Plucky was a good, solid 9.

## The Sociology of Computing

Naturally, Seaborne Systems, his employer, couldn't leave well enough alone. It would have been un-American not to invite him to join management. And it would have been un-American of Plucky not to accept.

Plucky's rotary engine began misfiring soon after he donned his management togs and received his key to the executive

rest room.

Plucky had a great, precise mind that honed in like a microscope on the details of the most intricate problem. As a programmer, these qualities were invaluable. As a manager, though, his interest in the microscopics began to come through not as a skill but as a bad case of tunnel vision.

Nobody cared in a staff meeting that Plucky knew why the insert-through-mask instruction beat the store field all hollow. It just wasn't relevant to understanding the "big picture."

## 'A Piece of the Action'

Seaborne Systems, at that time, had a contract with a major municipal port to develop a computerized inventory system. And Plucky, who had just made management about the time a change in the contract broke, was given a piece of the action.

In fact, he was given a very large piece of the action. Plucky's boss, who had been given responsibility for defining and

monitoring the change, was swamped. He delegated the whole thing to Plucky.

It was sort of like trying to stand up in a 30-foot surf.

Maybe they should have let Plucky sit on the edge of the pool for a while, and move gradually into the water. But he took the plunge before he even had time to think about it.

The first problem that hit him was that the computing equipment had to be enlarged. The change in the contract had some major functional aspects, and the old hardware just wouldn't hack it.

But that meant reprogramming what had already been done. Fortunately, it was in Cobol and a total rewrite wasn't necessary. Still, Brand "X" Cobol differed from Brand "Y" in more than just environment. When Plucky broke the news to the programming manager, he learned a new risk of being a manager — loss of popularity.

The thing that finally did Plucky in, though, was the facility management part of the contract.

The new computer needed more space. It needed more air conditioning. It needed, in fact, a bigger building. And Plucky, whose knowledge of hardware had been limited previously to virtuoso performances at an operator's console, faced a world of problems he didn't know existed.

## 'As a Programmer Might'

He tried to approach the problem as a programmer might. Look at the whole problem. Isolate the tough parts. Work them first. Then plan the total solution.

The trouble was, while he isolated one tough problem and worked it, the one he had solved previously was coming unglued. The team he assigned to evaluate and select a new computer did its job, and programming began recoding to the new Cobol specifications. But at the last minute Seaborne top management and the port officials balked at the computer selection, and dictated a different vendor.

Plucky's popularity in the programming department fell another meganotch.

Then when the computer was solidly nailed down and the programmers pacified, the air conditioner people chilled Plucky's world.

The new building design just wasn't adequate when it came to cooling the new computer. And that, in turn, called for a further enlargement of the building — across a river from the original site, with the only access to the new site being a port-owned bridge which would cost \$100,000 to refurbish to acceptable standards.

Well, as I said, the facilities management thing did Plucky in.

At first he joked about it all. "It's just my bridge over troubled waters," he would say wistfully. But it was all too obviously getting to him.

Whenever he came to see me he would reel off the whole tale of woe. Pretty soon he could talk of nothing else.

He not only covered the bad things that had happened already... he fantasized new and even worse events to come. And, more importantly, he quit working the problems.

He just nursed them along.

One of my favorite people on that job, seeing Plucky coming, would say, "The sky is falling... the sky is falling." It was that bad.

## A Happy Ending?

There ought to be a happy ending to this story. I ought to be able to say, "Plucky realized he wasn't cut out to be a manager, and turned in his key and returned to his coding pads." But I can't.

Seaborne working troops have an old saying about managers.

"Heads roll uphill at Seaborne," they say. What they mean is, if a manager doesn't make it in one position, he isn't fired; he is advanced to another position with an apparently higher rank, but no responsibility.

That's where Plucky is to this day. He's got a carpeted office, a view of the port and a firm grip on his key.

And he's a very unhappy man. Nobody likes to go to work with nothing to do.

## Maintenance Terms Unfair To User?

(Continued from Page 9)

some schools, colleges and universities that are not training to the best interest of the data processing world. But when we have been training programmers for 14 years and have an outstanding reputation of training qualified personnel, I had to take pen in hand and set the record straight.

I just wonder if Gresham's law could apply to the pressing need for upgrading the educational evaluators who have the "allness factor?"

David Aber is director of education for a computer institute in Pittsburgh.

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## New Attitude on Support?

# Warranty Promises Free Fixes 'Forever'

By Don Leavitt  
Of the CW Staff

LOS ANGELES — Some indication of the understanding that philosophically should exist between every software house and every client has been put in writing by Unicorn Systems Co. with its Software Forever Warranty.

Unicorn is a custom software house that generally develops large on-line systems for its clients. But the principles set forth in the warranty form could and, according to some observers, should apply across the board in any software sale. The company makes a good argument that this is more than a marketing gimmick.

The warranty certificate states simply that if the program named "should ever fail to conform to its specifications," Unicorn will provide the necessary technical personnel to correct the program, at no charge to the customer.

There are, as the company points out, reasons why it feels justified and, in a sense, honor-bound to offer this show of support for the user. First, Unicorn has pride in its work and claims to have construction techniques that assure correct performance when its software is delivered.

### If and When

But "no one can write you a guarantee that any nontrivial piece of software, when delivered, will be entirely free from bugs. Not even us," a company spokesman went on. That being the case, Unicorn says it offers the next best thing — a willingness to fix any bugs found, whenever they're found.

Short-term acceptance tests and "tricks" like three-month guarantee periods are wrong and really an insult to anyone buying a major system, Unicorn said, noting many installations don't fully exercise all the capabilities of their systems until years after initial installation.

Despite its righteous indignation about other vendors' customer support, Unicorn does have some restrictions of its own. But there are only three "catches" and an understanding of the reasoning behind them should work to the user's benefit, the company said.

The warranty ceases "immediately" if the client makes any modifications to the software Unicorn has built for him. The vendor admitted liking this idea "because it means more business for us" but claimed that should save money for the client.

### No Staff Needed

The savings will be possible because the client does not have to keep his own staff trained on the system. In addition, the client will only want enhancements if there is a valid business reason for doing them. An in-house staff can get into a project over its head before anyone determined what resources could be devoted

to the change, the firm noted.

If Unicorn is called in to work on a problem and it ultimately determines that the cause of the problem was not in Unicorn's software, the company will charge the client for costs incurred and time spent. Similarly, if in the course of solving a problem, Unicorn finds that the user has voided the warranty, a bill will be presented for services rendered.

### No Third Party

Transferring the warranted program to a third party is one way the client might void the warranty. Modifying the environ-

ment specified for the program is another thing that goes against the terms of the warranty, if Unicorn determines that the modification "induces or contributes to" incorrect program performance.

The third catch is a more general one, stating Unicorn is only responsible "to those representations made in its warranty statement." Warning the company makes no other warranty express or implied, Unicorn singles out warranties of merchantability or fitness for a particular purpose as two areas the agreement does not cover.

Unicorn is at 3807 Wilshire Blvd., 90010.

## Operating System for PDP-11s Handles Multiprogramming Tasks

MAYNARD, Mass. — Another real-time, multiprogramming software system designed to operate on the full range of PDP-11 computers has been announced by Digital Equipment Corp. (DEC). Designated RSX-11M, the disk-based system can be used for on-line program development and concurrent execution of real-time tasks.

The system is upward-compatible with DEC's RSX-11D software and can be used for both multiprogramming and background/foreground tasks.

It is "ideally suited" to real-time data acquisition and control jobs where smaller PDP-11 configurations are adequate, a DEC spokesman said.

RSX-11M takes advantage of the features of whatever PDP-11 configuration with which it is used. Even the most minimum configuration system employing RSX-11M is capable of operating in a multiprogramming mode, DEC noted.

### Complete Protection

In systems configured around the PDP-11/40 and PDP-11/45 CPUs, the software takes advantage of the memory management hardware as a system generation option. This provides complete protection of the operating system and individual tasks; such protection is particularly valuable in background/foreground operations and during on-line program development, DEC added.

RSX-11M also has data communication subroutines. Both synchronous and asynchronous communication modes are supported by the software system; asynchronous communication devices are sup-

ported in the full-duplex mode. Data can be transmitted at line speeds of 110- to 2,400 bit/sec.

A minimum configuration PDP-11 system that can employ RSX-11M would consist of any PDP-11 processor, 16K words of memory, real-time clock, 1.2M word Decpack disk system, automatic bootstrap loader, another mass storage device (disk, cassette or tape) and a hard-copy input/output terminal.

The license price of RSX-11M is \$3,000. Delivery is scheduled for the fall.

## Xerox Releases Update of CP-V

EL SEGUNDO, Calif. — Xerox Corp. has announced delivery of CP-V B00, its second release of Control Program-Five (CP-V), the virtual memory operating system for Xerox 560 and Xerox Sigma 6 and 9 computers.

Designed for flexibility in a multiuser environment, CP-V B00 allows simultaneous use of five modes of operation: multiprogrammed batch, time-sharing, real-time, remote batch and transaction processing.

Features of the B00 release include a capability for the shared processing of files, two categories of the real-time processing mode, an extension of intelligent remote batch terminal (IRBT) support and reliability, maintainability and availability (RMA) improvements, according to Xerox.

The IRBT extension will allow a medium- to large-scale Xerox computer to operate as a terminal to a larger computer, as well as responding interactively to an IBM 2780 or any Hasp-compatible terminal in a network environment, Xerox said.

Two levels of real-time processing are available in version B00. Centrally connected real-time programs begin execution as normal batch or on-line jobs, are

## Independent Links Cobol, 'Intercomm'

SACRAMENTO, Calif. — Programmers can be relieved of many of the complicated and tedious operations normally needed to send messages to and from CRT screens when operating under the Intercomm telecommunications monitor from Programming Methods by utilizing the Cobol Intercomm Interface Generator (Ciig) from Software Module Marketing (SMM).

To use Ciig, the programmer must know the format of the desired screen image, how the data is to be arranged in the output message and the expected input message format. This information is coded into parameter cards which are processed by Ciig.

Shaped to the user's needs, Ciig edits the message data for validity of coding and positioning on the screen, for report control table (RCT) and message input edit control table (MCT) printing and it also prints error messages indicating problems.

If no critical errors are detected, Ciig will generate, according to user specifications, the RCT and MCT reports and cards ready for assembly, Cobol source code or a report on the generated screen format, indicating data output and input lengths, screen positioning and any attribute positioning.

Ciig is available for \$3,950 including a one-day orientation, SMM said from Suite 1135, 555 Capitol Mall, 95814.

centrally connected to the interrupts by the system and have use of all available CP-V services. Response time is approximately one msec, the company said.

### Reserved Foreground

Directly connected real-time programs are loaded into reserved foreground memory and directly connected to their interrupts. Response time is less than 500  $\mu$ sec 99% of the time, Xerox claimed.

Either form of real-time processing allows the user to access individual pages of memory, access disk files and check hardware or software interrupt status. Pseudo-interrupts are used to minimize the number of hardware interrupts required for user software scheduling.

CP-V B00 allows the shared processing of a random access file. This capability is available to the user at the standard file management level or automatically through the use of the Xerox Extended Data Management System. At both levels, the user can update his files concurrently with other users.

The RMA features of CP-V have been enhanced in version B00. The system can now analyze and partition a defective device on-line while the remainder of the system is available and functioning.



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## 'A Decade of Failure' Failed

# Background Materials Overlooked at NCC Session

Iconoclasts are necessary to produce change in inertia-ridden academia. Perhaps the NCC session entitled "Business Data Processing Education — A Decade of Failure" had that goal. If so, it failed.

Most of the panelists spoke from a background of ignorance about prior work on curricula. They supported conclusions with statements such as... most of the data processing instructors with whom I have spoken..."

Certainly, business DP education needs constant re-evaluation. However, improvement results from analysis of academic programs of proven quality as well as analysis of failures. Published guidelines developed from such analyses are already available. However, the speakers at this NCC session seemed oblivious to their existence.

The nationally recognized guideline for computer science curriculum is "Curricu-

lum 68: Recommendations for Academic Programs in Computer Science," *Communications of the ACM*, Volume 11, No. 3 (March 1968) Pages 151-197.

That report provided recommendations for undergraduate programs. Graduate programs in computer science were discussed and some recommendations were presented for the development of masters degree programs. Ways of developing guidelines for doctoral programs were discussed, but no specific recommendations were made.

The study preceding this report lasted two years; 12 committee members were involved and 64 persons provided evaluations before the final publication.

### Curricula Guidelines

After widespread acceptance of Curriculum 68, ACM undertook a similar task for business information systems.

Two reports were developed. The first was "Curriculum Recommendations for Graduate Professional Programs in Information Systems," Robert L. Ashenurst, ed., *Communications of the ACM*, Volume 15, No. 5 (May 1972) pages 363-398.

The second report was: "Curriculum Recommendations for Undergraduate

Programs in Information Systems," J. Daniel Couger, ed., *Communications of the ACM*, Volume 16, No. 12 (December 1973) pages 727-749. The development and evaluation for these two guidelines employed the same rigorous process utilized in Curriculum 68.

A two-year program in business DP was developed by the national advisory committee for computer curriculum of the American Association of Junior Colleges.

The guidelines were published in 1970: *The Computer and the Junior College: Curriculum*, Richard W. Brightman, ed., AAJC, One Dupont Circle, N.W., Washington, D.C. 20036.

The advisory committee included representatives of four-year schools. Having served as one of those representatives, I can attest to the careful procedure utilized for the development of the junior college guidelines. Perhaps most important is the planned compatibility between those guidelines and the ACM undergraduate curriculum recommendations.

### For Teachers

One of the speakers at the NCC session concluded her presentation with a plea for a publication to aid teachers of DP. Two publications of this type have been in existence for many years. One is the *Journal of Data Education*, 516 Mass Ave., Truth or Consequences, N.M., 87901 (\$12 for eight issues per year).

Unfortunately this publication has deteriorated in quality. Whereas the typical 1972 issue was comprised of 25 to 30 pages, the typical 1974 issue was one third to one half that size. This month's issue has only three articles.

Hopefully, the earlier quality of this journal will be restored next year.

The other publication is *Computing Newsletter for Instructors of Data Proc-*

*essing*, Box 7345, Colorado Springs, Colo. 80933 (\$11 for nine issues per year). In its eighth year, this publication has subscribers in more than 400 colleges and more than 200 industrial training departments.

The newsletter describes computer curriculum, new system development techniques, pedagogical techniques, faculty education opportunities, new textbooks and computer programs which may be used for instruction. During the past three years more than 150 computer programs have been described. In each case the name and address of the developer are provided, to enable an instructor to acquire the documentation and the program.

### Bias Admitted

Because I serve as editor of this publication, I must admit a bias in its direction. Nevertheless, the lack of awareness of publications of this type, as exhibited in the NCC session, warrant description of these two publications in this column.

The NCC also included a session on computer science education. In great contrast with the session described above, speakers were thorough in their evaluation of efforts of predecessors. Also, their papers cited earlier work and provided an important contribution to the literature of the field.

Such contrast is embarrassing for those of us whose primary interest is business data processing.

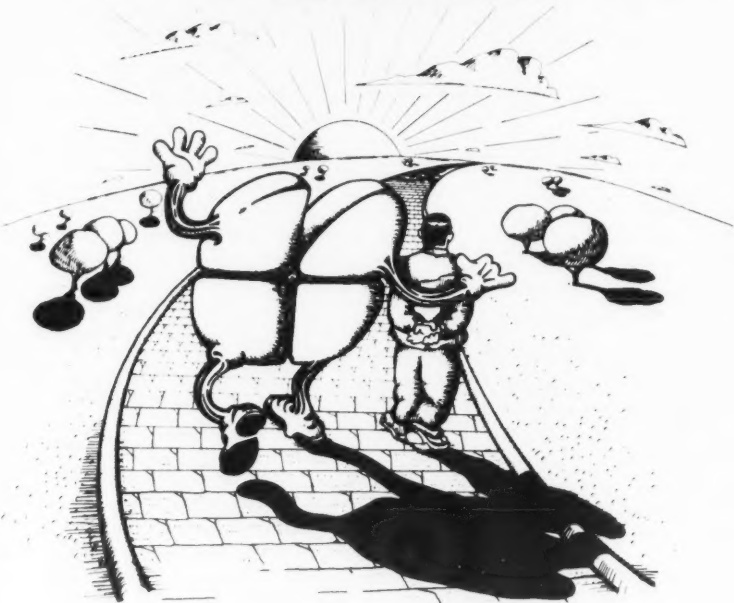
Perhaps the program chairman for next year's NCC will insist that the speakers for the business DP session are as well prepared as their computer science colleagues.

Couger is professor of computer and management science at the University of Colorado.



J. Daniel Couger  
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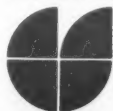
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## Supports Start/Stop Terminals

# Chicago School System Puts Time-Sharing to 'Music'

By Patrick Ward  
and Ronald A. Frank  
Of the CW Staff

CHICAGO — Users who operate in-house time-sharing systems on IBM CPUs often can save mainframe storage by utilizing Music instead of IBM's TSO.

Music, McGill University System for Interactive Computing, originally developed by IBM with Lockheed, was enhanced by McGill University and is now marketed by IBM as an installed user program (IUP).

Music's ease of use from the user's point of view and its lack of overhead made it the Chicago Board of Education's choice as the operating system for a 256K IBM 370/145 handling over 100 instructional terminals.

"We have found nothing that can even match, let alone beat it, for our application," commented Bernard J. Taheny, consultant for computer-based instructional systems for the board.

The board chose RAX, the predecessor to Music, as the operating system for its first in-house instructional computer, an IBM 360/40. As the workload grew, Taheny and Ted Gradolf, the board's consultant for computers, looked at Xerox systems and Univac's Exec system, but felt they were "too powerful" for handling a workload of student programs.

### Had What They Wanted

The board found that McGill university was enhancing RAX, now called Music, and that the new system had the enhancements they wanted, such as 2314 support and Cobol compilers.

The board had looked at OS and TSO, "and IBM's estimates, ignoring response time, which they didn't feel they could meet under any circumstances with a 145, were that they would require a TSO region of about 768K," plus the nucleus, which would add over another 100K, Taheny mentioned.

Additionally, the OS system would require a systems programmer to maintain it, plus a full-time operator. The Music system requires no operator and no system support, Taheny stated.

When supplied by IBM, Music costs \$1,190/mo for 12 months.

The Chicago system supports Fortran, Cobol, Algol, PLC, Basic and Assembly language, Taheny said. Students access Music from about 128 terminals, primarily IBM 1050s, but also 2741s. Additionally, there are six Datapoint 3300 terminals used in guidance tests, and some Teletype devices in a suburban school.

The system uses an IBM 3705 communications control unit with 80 simultaneous ports in emulation mode.

Response time averages about four seconds on the Datapoint units and the 2741s, Taheny said.

Among the advantages of Music over

TSO, according to Roy Miller at McGill, is the ability to operate more efficiently on smaller IBM mainframes. Music can support APL and the Watfiv Fortran compiler from Waterloo University, Miller said.

### Faster Than TSO

Citing Music's ability to support 60 start/stop terminals in 240K, Miller said it can also get a job started faster than TSO by a factor of several seconds.

To run TSO requires a minimum of 240K for system code, while Music needs only 110K for system code and buffers,

thereby leaving 110K for the user's program code and job. In addition, Music can run as a freestanding system without any IBM operating system while TSO operates in an OS environment. However, for users who want to run more than one software system, Music will run under IBM's VM/370, Miller added.

And another advantage is that the Music system is "designed to support just about anything" in the way of start/stop terminals, Taheny said. But not 3270s, he noted.

In evaluating Music, Taheny advised that the system is not for the user who

wants to do a great deal of business-type batch work. Music handles the batch just like a normal terminal, and does not support multiprogramming from the batch.

"If you're looking for something that can do occasional batch...like a big application once a day — this is a fairly good system with some nice things that OS doesn't have," he added, like an infinite spool for output to the printer and the punch.

The board of education has its own support contract with McGill, even though IBM now markets the system.

## Xerox 'Iden' Supports CRTs on 530 Mainframe

EL SEGUNDO, Calif. — A distributed processing system for the Xerox 530 computer has been introduced by Xerox Corp.

The Xerox Interactive Data Entry Network (Iden) is a terminal-oriented system for data entry, validation and inquiry. It can operate with Hazeltine 2000, Lear Siegler ADM-1 and other TTY-compatible displays that can interface with Xerox systems.

Designed to simplify the creation of an interactive network by any industry whose business information is dispersed in multiple locations, Iden is particularly applicable to the manufacturing, wholesale/distribution, banking, government, transportation and insurance industries, according to Xerox.

Iden combines with the Xerox satellite processor and the local batch processing capability on the 530 computer to form a

complete distributed processing system.

Information entered into Iden from local terminals can be processed, using the local processing capability of the 530 computer. This processed information can be retained and utilized locally, or it can be sent to the host computer for further processing or central storage.

### IBM Interface

Host computers include the Xerox Sigma 6 or 9 computers and the Xerox 560 computer. Iden can also operate as a preprocessor for IBM 360/370 computers. The IBM interface is accomplished in accordance with the Hasp Binary Synchronous Multileaving Protocol, which also allows communication with other host computers operating in this mode.

The basic Iden configuration consists of 32K words of memory, expandable to 64K words. A basic system also includes a disk storage device, a communications controller, a magnetic tape unit, a network of CRTs and a keyboard printer. Concurrent operation of Iden and remote job entry requires additional memory and an additional operator's console.

The Xerox 530 computer, a 16-bit processor, was designed specifically for data acquisition, communications and file processing application. Iden operates on the 530 system under the Real-Time Batch Monitor (RBM) operating system. RBM supports four programming languages: Extended Symbol (the 530 assembly language), RPG II, Cobol and Fortran.

The basic Iden software including operating system with minimum applications programs costs a user a one-time license fee of \$4,500. The basic hardware package to run Iden includes an 8K 530 CPU, 200 card/min reader, 350 line/min printer and one 800 bit/in. tape drive for \$52,000. An additional 24K of memory needed to run Iden would add \$16,500, a Xerox spokesman said. Iden is available immediately from the firm at 701 S. Aviation Ave., 90245.

## Burroughs Banking Terminals Handle Off- or On-Line Work

DETROIT, Mich. — Burroughs has added two banking terminals to control financial transactions at teller windows.

The TT100 transaction terminal is an on-line unit that can operate with existing Burroughs mainframe systems. It operates at 1,200 bit/sec in asynchronous half-duplex mode, and transmits Ascii data. An optional transmission speed of 1,800 bit/sec is also available.

The TR100 is an off-line version that generates a paper audit trail of transactions for later input to a CPU. The TR100 can later be field-upgraded into an on-line TT100 system as a bank's volume increases.

### Have Microprogramming

Both terminals incorporate microprogramming which simplifies field modifications. In this regard, Burroughs has said it plans to add IBM 2260 compatibility to the TT100 at a later date. Such a change could be added through microprogramming but a spokesman said no date had been set for the addition of the 2260 feature and the company declined to comment further.

The terminals include a plasma display that enables operators to verify keyboard entries. The on-line versions can display account information based on inquiries to the mainframe. An enforced sequence of

operations are said to simplify training for new operators on the devices.

The TT and TR systems accommodate documents of many sizes, including management report forms. Documents can be inserted in the validation chute from the top or from either side.

The systems can print 27 characters on a single line. Six spaces are for the user's identification, 10 are used for the transaction amount and the remaining positions are for dates, consecutive numbers and special purposes.

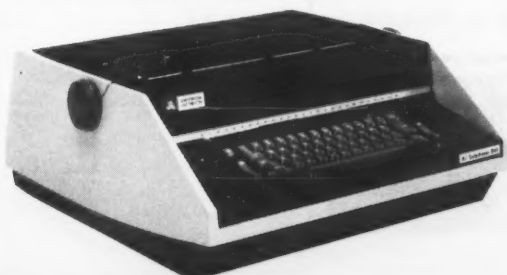
The TT100 transaction terminal systems contain transmit/receive buffers with capacities of up to 256 characters. In a data communications environment, the central computer and/or branch control computer can obtain information from the terminals in a selected sequence, randomly, individually or as a group.

Deliveries of the TR100 transaction recording systems are scheduled for the third quarter of 1974, and deliveries of the TT100 transaction terminal systems are scheduled for the first quarter of 1975.

Purchase prices for the TR systems range from \$1,595 to \$2,995. Purchase prices for the TT systems range from \$2,940 to \$3,935. Comparable monthly lease prices for TT systems range from \$74 to \$97.

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Gerard W. Schoenwald, Director of Marketing



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study with communications techniques at M.I.T., taught graduate-level computer systems design, and has served as professional consultant to such firms as IBM, Raytheon, ICC and MCI. Dr. Doll is in charge of our faculty of experts, and takes an active part in the entire seminar.

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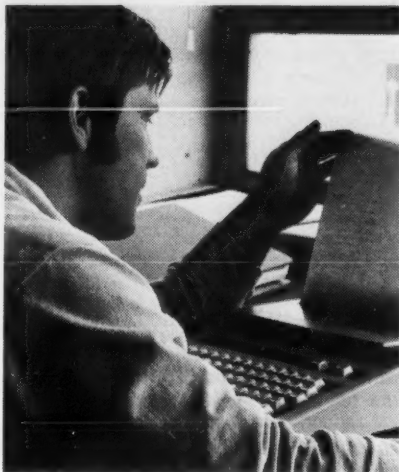
## On-Line System Lets University Spread Uses Throughout State

BURLINGTON, Vt. — The University of Vermont is spreading an academic computer around campus and throughout the state through the use of data terminals.

The terminals are on-line to a large-scale system in the Academic Computing Center, and the university has molded the computer into an integral, readily accessible part of the educational process.

The Regional Medical Program, which collects data on Vermont hospital patients and produces numerous tables, is using the computer terminal as a control device, in one application.

In Waterbury, about 30 miles away from the computer here, Project Crash (Countermeasures Related to Alcohol Safety on Highways) enters the latest drunk driving statistics into the system and, on demand, receives updated driver profile information for use in public education and enforcement.



At the Academic Computing Center at the University of Vermont, a staff member operates an NCR 360 data terminal.

### Peculiar Needs

The remote location is adapting the computer's capabilities to its requirements. The selection and use of an on-line terminal for these applications was based on needs peculiar to its objectives, environment and available funds.

Since relative speed, noise level, compactness and, to some extent, economics were factors, the university installed NCR 260 data terminals, thermal printers with typewriter-like keyboards that operate at 30 char./sec, a spokesman said.

Of the 42 remote users in the Academic Computing Center network, 11 have NCR 260 data terminals. The others work with teletypewriters, which print at 10 char./sec; 120 char./sec CRT display units; and plotters for engineering and drafting problems.

For Abets, a research project in the

phase-out stage that proved alcohol is indeed a driving problem, noise was a factor in selecting the NCR terminal. At Abets, two people work in a relatively small office and one can operate the terminal without disturbing the other, the spokesman noted. The desk-top unit also occupies relatively little space.

In at least one application, portability of the NCR terminal has been an asset. A single unit is shared by nine staff officers of the Academic Computing Center who wheel it from one office to another.

The Academic Computing Center leaves the choice of terminal up to the user. Organized in its present form on July 1, 1971, the center is a service organization offering computer time to departments on campus and education-oriented groups miles away.



Who else can provide a fully programmable intelligent data terminal that contains a full-scale minicomputer (like a PDP-8E), a CRT display, a 4096 12-bit word expandable memory, a selectric type keyboard with up to 51 additional function keys — **and has the capability to communicate with practically any computer under any line discipline or protocol?**

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- Text Editing
- Order Entry
- Credit Authorization
- Inquiry/Update

Peripherals are no problem either — the SiR-1000 can operate with IBM compatible magnetic tape, floppy disks, dual cassettes, card readers, badge readers, paper tape readers and punches, and both low and high speed printers.

So why not find out more about the MEGADATA SiR-100 POWERSCOPE data terminal. It emulates, calculates, formats, translates functions and data — and may well be the answer to your terminal problem.



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Other systems ready for immediate shipment are 370/155's and 360/65J, 50L, 40G and 30F. A 370/165K is scheduled for mid-summer 1974. Various peripherals are also available. Again, all specifications can be adjusted.

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# Datran Digital Network to Innovate For Data Users

VIENNA, Va. — When the Datran specialized carrier network goes into full operation it will also implement some innovative features designed for data users.

Some of these features were described in a recent speech by Glenn Penisten, president of the company. "The all-digital microwave system can satisfy the requirements of the data user in 1/10 of the frequency allocations required in analog microwave systems," he said. Datran has also developed its own time division multiplexing system along with a solid state digital nonblocking time division switch, he said.

The time division switch took more than three years and more than \$5 million to develop, but a full prototype is now working, he noted. Previously, there simply was no available system or hardware.

Each solid state switch is designed to provide switch services to more than 10,000 customers and will handle up to 80,000 nonblocking calls per hour within

a few hundred milliseconds, permitting the economies of billing time as small as six seconds.

## Network Control

Datran has also pioneered the first computer controlled centralized network control system to be found in any commercial communications network, Penisten said. A key feature of this innovation is a fault alarm and control system that permits computer polling of each unmanned repeater site from the central control every five seconds. In the Houston to St. Louis segment, for example, more than 6,798 alarm points can be monitored from headquarters every 1/12 of a minute. This, with other features, will assure availability of the service and has obviously been designed with the user in mind, Penisten said.

And to round out the technological picture, the entire system is designed with redundancy in its all solid state electronic components — with triple redundancy in the critical components.

The construction and operation of the system are also evidence of the demands unique to specialization. With the exception of space mission programs, no large scale effort other than Datran's has required such a systems approach to application of new technology, he said.

Datran is providing users heretofore unavailable choices within which there exists considerable latitude for the customizing of the service to fit their specialized needs. This would seem an appropriate test for any regulator to use in determining if a carrier's real concern is with the user public, he said.

The described flexibility is essential where no two users have communications requirements that are quite the same. Herein lies a dramatic distinction from the telephone business. Further, in marketing this specialization to meet data communications requirements, Datran accepts end-to-end responsibility for all of the transmission components of the user's teleprocessing system, Penisten added.

Specialization responsibilities carry over

into the tariff for a specialized service, he noted. Datran has recently tariffed a data transmission service that is performance guaranteed on a money-back basis if it does not achieve, on the average, 99.95% error-free transmission intervals of one second. That level of performance is required by data communications users if they are to maximize the productivity of their teleprocessing systems, he said.

By comparison, AT&T's proposed competitive analog-derived DDS service suggests an objective of 99.5% for error-free transmission, he stated. Datran is not only guaranteeing performance nearly 10 times better than that, but experience on the Houston to Dallas portion of the network is indicating performance at a level substantially greater than that guaranteed to the customer. This kind of communications performance will remove the burden that low data quality, high cost voice-grade circuits have placed on the efficient and productive use of data processing capital investments, Penisten said.

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## 300 Bit/Sec Possible On ATS OEM Modem

LOS ANGELES — Advanced Terminal Systems, Inc. (ATS) has introduced the Model M 2103F data modem module which provides for asynchronous full-duplex communications over two-wire voice grade lines at rates up to 300 bit/sec. The OEM modem is functionally interchangeable with the Bell System 103F data set, electrically and mechanically compatible with Intertel type 1038-9 modems, and end-to-end compatible with all Bell 103 and 113 series data sets. The M-2103 will operate via direct connection over private lines or may be operated in conjunction with dial-up lines when connected via a Bell System or ATS-supplied line coupler.

### Terminal Compatible

The data terminal interface is compatible with other EIA RS-232C or TTL/DTL signal levels. Additionally, a TTY current loop compatible interface is provided for both receive and transmit data lines.

The modem may be electrically switched between call-originate and call-answer modes by means of an externally supplied control signal.

Circuits to permit full in-system functional performance testing of the modem are provided on the printed-circuit card. Either analog or digital loop-back test modes may be commanded by an externally supplied control signal. An option is provided for nine on-card LED diagnostic indicators permitting rapid visual determination of modem performance.

Prices range from \$95 to \$195 in OEM quantities. The ATS address is Box 90121, 90009.

## Inforex 1303 Goes On-Line

BURLINGTON, Mass. — By adding a bisync communications feature, Inforex 1303 key-to-disk data entry users can transmit data on-line to IBM 360/370 computers. With the bisync feature users can also communicate to other compatible bisync devices as well as other Inforex systems.

Data can be captured at single terminal locations and transmitted off-line to the 1303. For on-line and off-line data transmission, half- or full-duplex lines can be used. The bisync feature adds \$100/mo to a 1303 rental. The firm is at 21 North Ave., 01803.

### Correction

SUNNYVALE, Calif. — Lease terms for Trendata terminals require a minimum one-year lease plus 90-day cancellation notice, according to a spokesman for the firm at 610 Palomar Ave., 94086.

An earlier report that the company had switched to a six-month lease plan applies only to word processing equipment, the firm said.



# SYSTEMS&PERIPHERALS



The Century 300 system maintains a record of 850,000 Uniform Commercial Code financing statements plus some 325,000 certification of incorporations records.

## Financial Paperwork Problem Eased by Texas' Century 300

AUSTIN, Texas — Although the Uniform Commercial Code (UCC) simplifies interstate legal and financial dealings, states that receive a large number of listings often have a recordkeeping headache.

To overcome the problem, the State of Texas uses a two-part on-line data system to handle over 1,000 inquiries daily related to its commercial and corporate records.

The Texas file, in fact, contains some 850,000 UCC financing statements and involves the addition of 100,000 new filings each year.

Installed in 1972, the UCC system has greatly improved the state's service to lawyers and financial institutions which generate an average of 100 telephone inquiries seeking information from the file every day. In addition, each day's mail brings 700 to 1,200 more inquiries, new financing statements, change statements and other information requiring file access.

These transactions are handled by six clerks who use NCR 795 CRT terminals to search a disk file containing synopses of the 850,000 financing statements.

If a lender calls to ask about financing statements involving a certain would-be borrower, for instance, the clerk receiving the call immediately enters the borrower's name into the terminal. Once a file "hit" is confirmed all financing statements involving that borrower are displayed on the screen.

The clerk reads the pertinent data to the inquirer.

To get a hard-copy report, the operator can depress a key requesting the computer to print the statements desired.

In addition, the computer — an NCR Century 300 with 375K core memory — automatically prints the bill (\$5 for each inquiry), ready for mailing in a window envelope along with reports requested.

Financing statement synopses, each averaging approximately 250 characters, are loaded on two NCR 657 96M-byte disk drives.

### Weighing Routine

The index system, basically a modified version of the "Alphadex" system developed for California's UCC batch file, includes a weighing routine by which the computer picks out and lists "sound-alike" names in the event a direct hit cannot be confirmed.

New financing statements are added to the file by use of the CRT terminals. Terminating statement data also is entered via the terminals to delete 30,000 statements yearly.

"The major justification for installing the computer is the file integrity it maintains," said Mark W. White Jr., Texas' secretary of state. "Prior to its installation," he added, "we were not as confident in the thoroughness of our file searches. The manual files contained index cards for over 750,000 documents,

necessitating the manual checking of a large portion of the file for a single search.

"When such variables as human error, the possibility of erroneous spelling, etc. are considered, the thoroughness of a manual search is subject to question," he noted.

Justification for the computer and peripheral equipment, which costs approximately \$25,000/mo, is shared both by the UCC application and a corporation division data retrieval system which became operational in December 1973.

### Corporate Data

The corporate file, which occupies some 150M bytes of disk storage, consists of

(Continued on Page 22)



NCR 795 terminals update the Texas system.

## Burroughs Fills In L Series With Six Mini-Based Units

By Vic Farmer  
Of the CW Staff

DETROIT — Burroughs has announced two L 8000 Series accounting minicomputers for the high end of that series, and four smaller machines that will form its new L 6000 Series.

Five of these six minicomputer-based accounting machines can be converted to on-line satellite computers on site and can be used with Burroughs or other central computer systems, according to the firm.

In terms of productivity, the L 6000 Series (L 6200, L 6300, L 6400, L 6500) is placed between the L 2000 through L 5000 Series and previously released models of the L 8000 Series.

The L 8800 and L 8900 machines pro-

vide information at high speed while the system is processing data.

A 32-character printer buffer provides faster output by allowing the systems console printer to position itself, print and space, independent of keyboard and processor functions, the firm stated.

### LSI Speeds Processing

On the L 8800 and 8900 models, a new 30 char./sec console printer has a positioning speed of 330 char./sec. Productivity of the L 8800 and 8900 models is also significantly increased by the use of large-scale integrated circuit logic and up to 64K bytes of semiconductor memory, Burroughs noted.

All of the systems have a 100-char./sec



This L 8900 system is the top of Burroughs' L Series.

vide the highest performance of any L Series systems yet announced.

When compared with the L 5000 minicomputers, comparable models of the new systems provided from 20% to 200% greater throughput in performance tests involving a number of standard business and financial applications, according to Burroughs.

The L 6500 and L 8900 magnetic record models use a magnetic record feeder/stacker to feed records into the system's console for reading and updating and then restacks them automatically. The use of the feeder/stacker eliminates individual handling of the memory records and increases throughput by 25% or more, Burroughs said.

A 32-character buffer on the new electronic keyboard permits operators to enter

photoelectric program loader which reads program information into memory 85% faster than previous models, the firm said.

A library of Burroughs application program products is available and includes management report and analysis programs.

L Series program products developed by Burroughs are written in Cobol and are fully transferable from system to system when users move to more powerful L Series models.

Peripherals available with the systems include from one to four magnetic tape cassette stations, paper tape and edge punched card equipment, an 80-column card reader, a computer-compatible magnetic tape unit which can collect data from up to eight systems, and an automatic magnetic record reader that can work independently of or in conjunction with the automatic magnetic record feeder/stacker.

In addition, the L 8800 and L 8900 models offer line printers operating at 85-, 160- or 250 line/min, 80-column card equipment and 96-column card reading, punching and sorting devices.

The L 6200, L 6300 and L 6400 models provide a choice of 15-1/2 in. or 26 in. wide forms handlers. The L 8800 forms handler is 26 in. wide.

The L 6500 and L 8900 have 26 in. wide forms handlers and can utilize magnetic memory records in a variety of sizes. The L 6500 can store up to 352 digits of information in each magnetic memory record, the L 8900 up to 704 digits.

L 6000 models are available immediately and the L 8900 models are scheduled for delivery in the third quarter of 1974. Deliveries of the L 8800 are scheduled for the fourth quarter of 1974.

Purchase prices for basic L 6000 models range from \$7,350 to \$22,480. Purchase prices for basic L 8800 and L 8900 models range from \$16,990 to \$28,780. Peripherals, input/output subsystems and memory size options are in addition to the basic systems prices.

## DG Packages Nova 2/10 Systems

SOUTHBORO, Mass. — Data General has packaged five systems based on Nova 2/10 minicomputers for the end user.

- An RTOS system, priced at \$10,900 and supported by a Real-Time Operating System includes 32K bytes of memory, real-time clock, power monitor, automatic restart and a Teletype terminal.

- An SOS system, priced at \$16,100 and which runs the firm's Stand-Alone Operating System, includes 32K bytes of memory, a paper tape reader and punch, cabinet and a Teletype terminal.

- A medium-scale RDOS System, which runs the Real-Time Disk Operating System, includes 64K bytes of memory, a 2.4M-char. moving head disk, paper tape reader, cabinet and Teletype terminal. It is priced at \$27,350.

- A large-scale RDOS system with 64K bytes of memory, a 4.9M-char. moving-head disk, a 45 in./sec magnetic tape transport, a paper tape reader, a 165 char./sec, 132-column line printer and a dual cabinet is priced at \$49,500.

- A dual-processor, shared disk system is priced at \$57,100, with a shared 4.9M-char. moving-head disk. Each proc-

essor has 64K bytes of memory and a real time clock, and the system includes a paper tape reader, a dual cabinet, inter-processor bus and two terminals.

Any of Data General's optional equipment or peripheral devices may be added to any system, according to the firm.

The Nova 2 computers used in the systems have a cycle time of one  $\mu$ sec, and can hold up to 10 standard 15-in.-square printed-circuit boards.

The systems are scheduled to start delivery in two months.

### Tape Checks Alignment, Speed

LOS ANGELES — A master alignment and speed calibration tape, developed by Wangco, Inc., is designed for checking operating parameters on any IBM- or Ansi-compatible magnetic tape transport.

The tape is full-width, pre-recorded and fully compatible with IBM master alignment tapes.

The Wangco tape can calibrate tape transport speed, due to recording frequencies that are accurate to  $\pm 1\%$ .

A full channel signal is provided at a density of 800 bit/in.



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Series 60 includes significant large-system capabilities that make it easier for large, dispersed organizations to tap and use the power of the computer where it's needed.

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The organization, processing, and timely availability of data about your business are obviously your first priority. Everything else—hardware, software, programming languages—is there just to help you get at and use this data.

For many companies, this can best be done with one central information source—available to every part of the organization.

Honeywell's larger Series 60 systems provide a powerful data base management capability that lets you define real-world situations and relationships as they occur. With Series 60, you can assemble larger data bases, share files, and modify existing data bases more readily.

#### **Information networking**

With Series 60 we developed new data communications techniques, new ways to distribute information rapidly throughout your company—to and from remote locations such as branch offices, warehouses, and factories. We call this approach "information networking."

First, larger Series 60 systems let multiple processors share a common

data base as well as peripheral resources. This means increased flexibility and efficiency in information networking operations.

Second, our DATANET\* front-end network processors handle communications without tying up the host central processor. And our DATANET\* remote network processor does such chores as remote job entry, remote batch processing, and line concentration to further improve data handling and reduce data transmission costs.

Third, our Network Processing Supervisor (NPS) offers a new level of data communications efficiency and control. NPS software controls all communications workloads, performs message switching and extends the system's ability to remain operative and ensure data integrity. NPS is easy to use (design programming time is dramatically reduced) because of its macroinstructions, and because parameter tables make it simple to add terminals and expand the network.

#### **Transaction processing**

Honeywell's Series 60, with GCOS transaction processing, now makes online transaction processing practical for many companies who may have previously considered the complexity and cost of such systems prohibitive.

To simplify the system, only data is entered at the terminal. Terminal users don't enter a program, control cards, or even program control statements. They don't even need to know that computer programs exist. Without any specialized training, personnel can activate—through a single entry—the multiple functions

necessary to perform complex business transactions.

#### **The GCOS executive**

Series 60 strengths like data base management, information networking and transaction processing are all part of the processing environment made possible by Honeywell's GCOS (General Comprehensive Operating Supervisor). GCOS has been widely recognized as the most advanced operating system in the industry. And we've made it even better for Series 60.

Four models of our Series 60 provide the full range of new GCOS multidimensional capabilities—transaction processing, batch processing, remote access processing, and time sharing—all running on one system. This merging of processing dimensions in concurrent operation lets you tailor the processing mix to individual installation requirements. You can even make changes throughout the processing day. And it's more effective than multiple-system installations.

#### **It's easier to get to than you may think**

We've done a number of things to make Series 60 systems easier to install. We have conversion aids, programming tools, debugging aids, new COBOL standards, in-depth systems support, and the convenience of our DATANETWORK\* time sharing and remote batch service for pre-installation processing.

As a matter of fact, we hope you'll want to learn a lot more about Honeywell's Series 60 family. Just give our local office a call. Or write Honeywell Information Systems (MS 061), 200 Smith Street, Waltham, Massachusetts 02154.

## **The Other Computer Company:**

# **Honeywell**



# Century System Simplifies State Financial Records

(Continued from Page 19)

data from certificates of incorporation for some 450,000 Texas corporations. The data includes corporate name, name and address of registered agents and offices of the corporation, names of incorporators, capitalization, etc.

This computer-managed file services 12 CRT terminals in the Corporation Division where clerks receive an average of 350 telephone and 100 written inquiries daily.

The same terminals are used to establish records for 1,300 to 1,500 new businesses that file for certificates of incorporation each month. Typical inquiries ask for file searches to determine name availability for new corporations, to determine whether a proposed name already exists or whether one similar to it is already on record.

NCR was contracted to develop a complete new alphanumeric access system for this file and, said Owen Coon, director of the Computer Services Division, "they've come up with something far superior in the way of an index to a large on-line alphanumeric file. We expect to convert our UCC index to the new approach by September 1974."

Essentially, the new system is based on an alpha retrieval algorithm involving a practical method of reducing every word to its phonetic equivalent. Each corporate name in the file has a number (original

charter number) and a cross-index leads the computer from phonetic equivalent words to the actual name.

The system is so constructed that a clerk may first ask for a direct hit on a corporate name. Failing this, the computer displays up to 20 names nearest it in terms of phonetic sounds.

"In fact, extensive timings indicate search and retrieval of the phonetic index and response to the CRT takes an average of only 26 seconds using the new system," Coon said, "and our goal is to achieve an average access time of 15 seconds."

Both UCC and corporate records are challenging problems in most states. "Generally," Coon said, "the bigger the file, the bigger the problem and the greater the chance for error when manual systems are used. At least eight or 10 states have files large enough to justify a system similar to ours."

"Had we not installed our system when we did, we would be in real trouble in Texas. We would have needed more clerks, working less efficiently, with more motorized files for which we had no space."

Moreover, Texas has found automated service in these areas will more than pay for itself in revenues generated. When Texas installed the UCC system, it was projected that the secretary of state's office would take in \$485,000 in the first two years in service charges assessed for answering inquiries and filing new financing statements and amendments — just about enough to cover the cost of the computer system. It turned out that requests for service far outpaced projections and service revenues brought in \$1.2 million in the first year.

## Decitek Offers Photoelectric Reader

WORCESTER, Mass. — Decitek's photoelectric punched tape reader, priced at \$295, handles 6-, 7- or 8-level tapes at up to 100 char./sec. A 5 V and 24 V power source is required. The firm is at 15 Sagamore Road, 01605.

## OEM Products

### Semiconductor Compatible With Many Fixed-Head Disks

SUNNYVALE, Calif. — Intel's IN-63 semiconductor memory system is plug-to-plug compatible with several types of small fixed-head disk memories. Full memory capacity is 90 "data tracks" with 5,120 serial bits in each track.

The IN-63 can be adapted to replace additional types of small fixed-head disks with a special wire wrap interface card. This card can be adapted to meet the specific addressing, data, clocking and other requirements of the small fixed-head disk it is replacing, Intel said.

The system is priced at "less than one cent/bit," the company said. Enhanced maintenance and reliability are possible because maintenance consists of simple card substitution and because of the inherently greater reliability of semiconductor devices, the firm added.

The system is contained in a standard 19-in. rack-mounted enclosure 7 in. high and has its own cooling. It contains a power supply that operates on standard line current, and also provides batteries for standby power.

When less than full capacity is desired, the system can be decreased in increments of 45K serial bits.

The firm is at 1302 N. Mathilda Ave., 94086.

### 16-Bit Ruggednova Added

CUPERTINO, Calif. — The 16-bit word 1603 Ruggednova minicomputer from Rolm Corp. meets military environmental specifications to provide users with a heavy-duty minicomputer.

The 1603 is conductively cooled and includes a four-card CPU, 8K of memory expandable to 32K and a 47-440 Hz

power supply. Core memory is available in 8K increments, and up to two semiconductor memory modules can be installed in the chassis. All memory in the 1603 provides minicomputer cycle time of 1.2  $\mu$ sec.

Direct memory access is standard. The optional one-card extended arithmetic unit provides 7.7  $\mu$ sec. hardware multiply/divide.

The 1603 uses the standard Rolm instruction set and is compatible with the Rolm 1601 and Data General Nova computers.

Included in the \$9,950 price are individual software manuals, a week of software training and a week of hardware training.

The firm is at 18922 Forge Drive, 95014.

### Tape Unit Reads 300 Char./Sec

KENT, Wash. — The R2000 photoelectric tape reader from Tally Corp. offers bidirectional reading speeds to 300 char./sec continuously, and up to 200 char./sec asynchronously.

Using a deep socket reading technique, the R2000 reads tapes with up to 60% transmissivity, Tally said. This technique allows read head exposure to ambient light with no effect on reading reliability, and permits complete visibility of the last character read, the firm added. It reads 5-, 7- and 8-level tapes interchangeably.

Reliability tests indicate not more than one read error in every 10 million characters read, according to the firm.

The unit is DTL- and TTL-compatible.

Options include proportional servo reeling with take-up on 7-1/2 in. Lexan reels, fanfolding tape handling and typesetter configurations.

Prices in single quantity start at \$546. Tally is at 8301 S. 180th St., 98031.

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# COMPUTER INDUSTRY

## CI Notes

### Honeywell Restructures

MINNEAPOLIS, Minn. — Honeywell, Inc. has restructured its top management bringing together Stephen F. Keating, president, and vice-presidents Edson W. Spencer and C.W. Spangle into the newly created Office of the Chief Executive.

The new format "will insure maximum broad corporate input to all operating and policy decisions," Keating said.

Spencer and Spangle will retain their primary responsibilities for operating the Control Systems Division and Information Systems Division respectively.

The change will entail the move of the Information Systems headquarters from Boston to Minneapolis. However, Boston will continue to be the headquarters for the North American operations of information systems.

### Digital Receives Memory Patent

MAYNARD, Mass. — Digital Equipment Corp. (DEC) has been granted a U.S. patent covering the memory access operation of its Decsystem-10 series of computers incorporating the K110 processor.

The patent names three DEC employees as co-inventors: Alan Kotok, Allan R. Kent and David A. Gross.

### Firm to Study U.S. Procurements

WASHINGTON, D.C. — Decision and Design, Inc. has been awarded a consulting contract by the U.S. General Services Administration, for a government-wide study of policies pertaining to the acquisition and management of automated data processing systems.

The study will consider criteria for government reliance on private industry, economic factors in making lease or purchase decisions and the relative merits of centralization or decentralization of government DP resources.

### Supershorts

Tycom Systems Corp. has appointed Advanced Techniques as its sales representative for OEM products for Arizona, Nevada, California, Washington and Oregon.

California Computer Products plans to double the size of its national OEM sales force.

Some 1,450 employees of Hewlett-Packard's Data Systems Division received \$718,105 under the company's cash profit-sharing plan.

Granvia, Inc. has been recently formed for the development of proprietary products in the fields of computer architecture, microprogramming and computer logic.

## Interfaces for All CPUs Promised

# Digital Creates New Components Group

By Vic Farmer  
Of the CW Staff

MARLBORO, Mass. — There's money to be made in the higher volume independent peripheral and minicomputer logic subassembly market, and Digital Equipment Corp. (DEC) is out to carve itself a piece.

DEC's new components group headquartered here is slated to eventually sell a line of 20 peripherals, DEC's line of microprocessor and minicomputer logic modules and a custom-building service for large users. But most interestingly, DEC will provide interfaces to nearly any other company's computer.

There are a few catches, however: The buyer must buy in quantities of 50 unit/yr; the goods must be shipped either in 10-unit or pallet-size quantities; there will be only a 30-day warranty; no system software will be supplied except diagnostics; and the new division will not maintain the equipment.

Users seeking maintenance will have to get maintenance through a separate division of DEC or from independents.

In launching the new division, Ken Olsen, DEC president, explained the computer market and DEC's strategy has rapidly changed from the past. DEC's past was dependent on picking a specific segment of the overall market and then saturating this segment with special services such as software and engineering support.

But times have changed and this new division will be oriented to customers

who have grown in their sophistication.

"It is wrong to load down the customer with service he doesn't need... it is better to provide low cost components without any handholding," Olsen summarized.

DEC estimated the potential size of the peripherals and logic component market is divided into \$500 million/yr for peripherals, and \$100 million/yr for logic components such as microprocessors on a board.

### Products Offered

Products offered by the components group will concentrate on processor devices and low-cost terminals most often encountered in high-volume applications, and in custom-designed devices for large-quantity production.

Existing peripherals to be stocked by

the group include: TU60 dual cassette tape systems, RT01 30-character data entry keyboard terminals and RT02 64-character data entry keyboard terminals.

Processor components to be stocked include: MPS microprocessor series modules, including 8-bit central processors; 1K to 4K semiconductor Rams; 256 to 4K Proms; PDP-8/A board-oriented component computers; and M and K series solid-state logic modules.

Customer component products will typically include: peripheral and processing devices, designed and manufactured in high volume to meet customer specifications; and intelligent terminals, combining data entry and retrieval with logic, arithmetic and memory, according to DEC.

The components group will formally start business July 1, and will initially involve over 100 people.

## DJ-BR News Retrieval Service Lists Data on 6,000 Companies

NEW YORK — A computerized news retrieval service based on stories appearing on the Dow Jones News Service and in the *Wall Street Journal* and *Barron's* magazine will begin nationwide operation this week.

Developed as a joint venture by Bunker Ramo Corp. and Dow Jones & Co., Inc., DJ News-Recall permits instantaneous recall of stories on 6,000 companies listed

on the New York and American stock exchanges and traded over-the-counter. Users also can retrieve any story that has appeared during the previous three months on 25 industry groups, 15 government agencies and several general categories.

"We originally intended this news retrieval system as a research resource for the stockbrokerage industry," commented a spokesman for Bunker Ramo, "but realized that a service coordinating financial, monetary and government news might be of interest to government agencies and private industries as well."

Test installations in five stockbrokerage firms during April "have allowed us to shake down the system and prepare for nationwide marketing," said Anthony A. Barnett, senior vice-president of Bunker Ramo.

Corporation and government interest in the service was exhibited at a demonstration of DJ News-Recall held in Washington, D.C. the last week in May, according to the Bunker Ramo spokesman.

When announced at the end of April, the service was limited to 20 New York offices. No one outside of New York and the eastern U.S., with the exception of those who attended the Washington demonstration, had seen the system. As of this week, 30 to 35 more offices will go into service.

Barnett said the basic charge for DJ News-Recall to users of Bunker Ramo's System/7 will be \$175/mo per office plus \$25 for each video terminal having access to the news retrieval service.

Dow Jones-Bunker Ramo News Retrieval Service, Inc. plans to market the data base to distributors for resale.

## Japan's Production Seen Rising

TOKYO — Japan's rate of production of computers and related equipment in 1974 should rebound to nearly 20%, according to a forecast in *EDP Japan Report*.

The 20% is in contrast to the 12.3% level recorded in 1973, which approached the 11.6% level in the "depression year of 1971," the newsletter noted.

The report contains figures from the Electronic Industries Association of Japan (EIAJ), which predicted the 1974 output of computers and related equipment will reach about \$2 billion, up nearly 25% over the 1973 level of \$1.6 billion.

In 1972, production stood at \$1.4 billion, according to EIAJ figures.

Orders for computers rebounded quickly after a slump in the second quarter of 1973, and there has been no change in the upturn since the beginning of the year, EIAJ said, adding it expects the computer industry to progress regardless of whether a recession occurs.

While in 1973 production was only up around 10% in terms of value of equipment, the increase was closer to 30% to

35% when measured in quantity, figures from EIAJ show.

The number of mainframes jumped from 4,500 in 1972 to 7,466 in 1973, of which 4,004 were for general use, excluding control, and 496 for control.

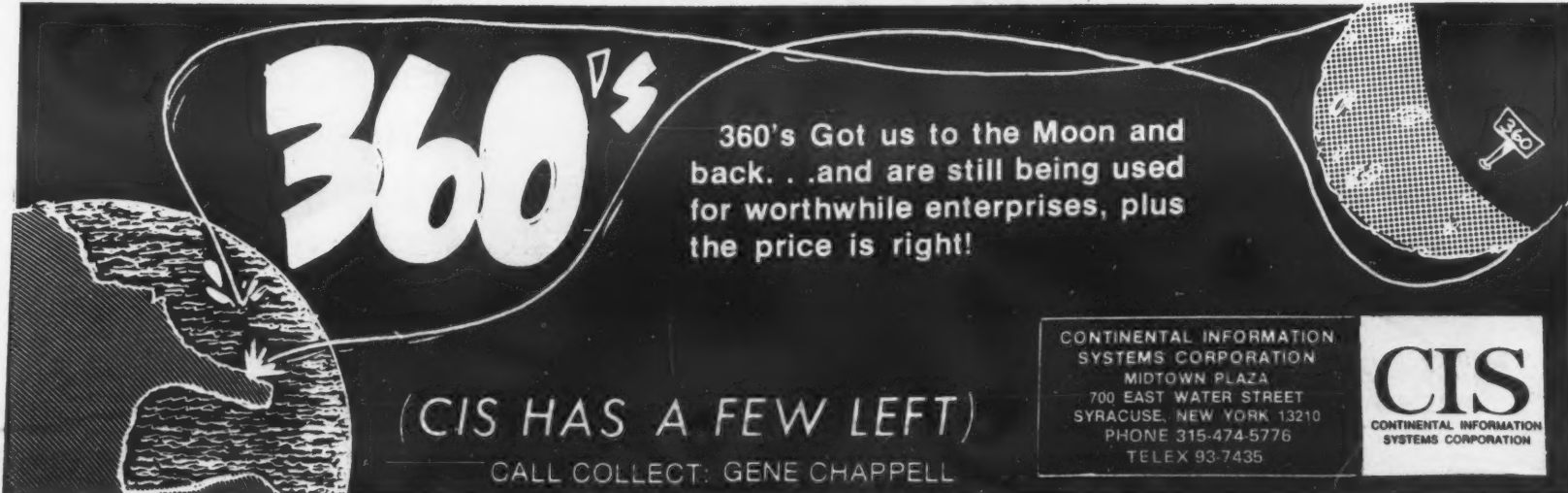
The value of mainframe shipments increased from \$652.2 million in 1972 to \$730.8 million in 1973, the report said.

Accessory equipment, external memory and I/O devices all showed large jumps in the numbers of units shipped.

The quantity of external memories more than tripled from 11,029, or a value of \$278 million, to 34,914 or \$338.1 million, while I/O devices proliferated in number from 13,338 to 52,993. However, the value of I/O shipments declined from \$280.5 million in 1972 to \$266.1 million in 1973, the report said.

Accessory equipment, which jumped in quantity from 32,445 units to 103,507 in 1973, showed an increase in value from \$647.3 million to \$724.6 million, again reflecting declining prices.

The EIAJ figures include production of foreign affiliated firms, such as IBM Japan and Oki Univac.



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## Impact Spreading

# POS Sales Seen Exceeding \$1 Billion by '79

By Toni Wiseman  
 Of the CW Staff

NEW YORK — Annual sales of point-of-sale (POS) equipment can be expected to exceed \$1 billion by 1979, with some \$10 billion worth of POS systems being sold over the next 10 years, according to a market report by Frost & Sullivan, Inc.

"Though the initial impact of the electronic POS development has been on the general retail department store, the trend has begun to spread to super-  
 markets, restaurants, service stations, hotels, entertainment locations and wherever credit cards are accepted," the report stated.

The U.S. Government, in particular the PXs and commissaries and the Postal Service, has also become a large potential user, the study showed.

Over the 10 years, some \$700 million in computer revenues will be attributed to the upgrading of computer installations to meet the needs of electronic POS and credit terminal systems, the study continued.

Specifically, Frost & Sullivan forecast sales of 69,000 POS units or \$264 million in 1974, along with 85,000 credit card terminals or \$48.2 million.

By 1977, POS sales will have risen to \$582.5 million and credit card terminals to \$97.5 million, the report predicted.

POS software sales will rise from \$800,000 in 1974 to \$4 million in 1980 when POS hardware sales will have reached

\$803 million and credit card terminals \$124 million.

### 'Virgin Markets'

The "real virgin territory," according to the study, consists of the supermarket sector where sales are projected to reach 20,000 terminals or \$200 million annually by 1976.

In 1979, Frost & Sullivan predicted, the annual volume should increase to \$340 million and surpass the sales of POS to

the general retail department store.

The concept of combining supermarket and department store operations, while a fairly new idea in the U.S., has caught on in Europe and will have a significant impact on POS systems, the report predicted.

Software development has lagged behind hardware, the report said. "More software development is now being accomplished by the retailer, and no

software company has sought to market a merchandise control package," it noted.

The study looks for the first of these software packages to appear in 1974.

"Although there is room for many companies," the report concluded, "it becomes obvious that a few companies will dominate, most likely NCR, Singer, IBM, TRW and Addressograph Multigraph in their particular areas of endeavor."

## 80% of DP Users 'Potential' FM Clients

NEW YORK — Approximately 80% of the DP installations in the country today are potential clients for the growing number of facilities management firms, according to Bruce Wright.

Wright, director of communications for Systematic, Inc., a facilities management firm, noted the outlook for facilities management firms is particularly good in the near future, in spite of the economic difficulties in the country.

"If a recession does materialize or the energy crisis gets worse," Wright said, "it would probably have a positive effect on the future of facilities management."

A recession, he explained, would force most companies to take a closer look at the efficiency and economy of their computer operations. Since fa-

cilities management firms typically offer clients improved economy and efficiency, Wright concluded, many companies would seriously consider the facilities management approach as an alternative to an in-house operation.

Wright noted since 1969, facilities management firms as a whole have enjoyed a 45% increase in revenues, adding that current annual revenues of approximately \$400 million are predicted to increase to \$1 billion in 1975 and could climb to \$2.5 billion by 1985.

The basic concept of facilities management firms is that a concentration of technical and personnel resources in a single firm specializing in DP provides more efficient and economical data processing to a number of companies in the same business.

Also, he said, since financial management firms typically market excess computer time to small retail or commercial customers, the costly equipment can be utilized more efficiently than at a company's in-house operation where the hardware must be paid for regardless of whether it is used to capacity.

Factors related to personnel, equipment and management control will also benefit the growth of facilities management firms in the near future, Wright averred. "The significant personnel problem facing the DP industry," Wright said, "is the lack of career paths above the technical levels."

"Because of the very high specialized technical expertise required of DP professionals, career growth is limited. Where can a professional move up to from DP management in most companies today? Nowhere," he answered.

The facilities management firm, however, can offer the DP specialist progress to the limit of his abilities, he indicated.

Wright noted many companies are currently riding out long contracts on equipment purchased during "the great hardware armament race" — equipment with capabilities far beyond the organizations' needs.

"This," he said, "means a facilities management firm can take such a computer operation, use the equipment for more than one client and realize efficiencies and economies of scale while actually saving money for the original user."

## Contracts

Cubic Western Data, Inc. has been awarded a \$5.1 million contract by the Bay Area Rapid Transit District (Bart) for automatic fare collection equipment.

Bright Industries, a subsidiary of Data Disc, Inc., has received an OEM contract from Cummins-Allison Corp. for purchase of its 2700 Series tape drives. Bright will supply Cummins-Allison with two models, the 2730 and 2740.

Pertec Corp.'s Peripheral Equipment Division has been awarded a \$1.6 million contract by Computer Machinery Ltd., England, for magnetic tape drives to be used in its data entry systems.

Caci, Inc. has received a contract from the U.S. Navy for the implementation of the Simscript II.5 simulation and programming language compiler, which will be used for simulation model development on government CDC 6000 series systems.

Sierra Data Systems has been awarded a contract by Yellow Cab of California for further automation of taxicab order-taking and dispatch via the Total Activity Exchange Index (Taxi) System.

Acts Computer Corp. has received an extension of its contract with the NASA Institute for Advanced Computation for facilities management of the IAC Computing System.

Computer Sciences Corp. has been awarded a programming

contract from the Atomic Energy Commission for the conversion of programs from Univac 1108, IBM 7090 and GE 225 systems to a Control Data Cyber 74.

General Electric's Information Services Division has received a three-year contract from the Air Force to supply time-sharing computer services for the Cooper Impact program.

Datacrown Ltd. has been awarded a five-year contract by Canada Cement Lafarge Ltd. to handle the company's computer requirements.

Raytheon Co. has received a \$5.5 million contract from the Federal Aviation Administration for 17 maintenance and operation stations to support the Computer Display Channel component of FAA's automated en route air traffic control system.

Medlab Computer Services, Inc. has been awarded a contract by the University of Minnesota, Departments of Laboratory Medicine and Pathology and University Hospitals, for the installation of Pathlab, a laboratory information and management system.

## Expansions

Data Devices International, Inc. has moved to the Warner Ranch Industrial Complex, Woodland Hills, Calif., in view of future growth.

Software Design Associates, Inc. has opened an office at 1701 N. Fort Myer Drive, Arlington, Va.

Interdata, Inc. has opened a West Coast systems engineering and software group based in Santa Clara, Calif.

Boole & Babbage has opened a regional office at 21 Charles St., Westport, Conn., to offer marketing and customer support to facilities in the Northeastern states.

Kybe Corp. is completing a 25% expansion of its headquarters in Waltham, Mass., to pro-

vide additional manufacturing space.

Computedics has relocated to 10560 Main St., Suite 202, Fairfax, Va.

Cyphernetics Corp. has opened an office at 100 Charles River Plaza, Boston, Mass.

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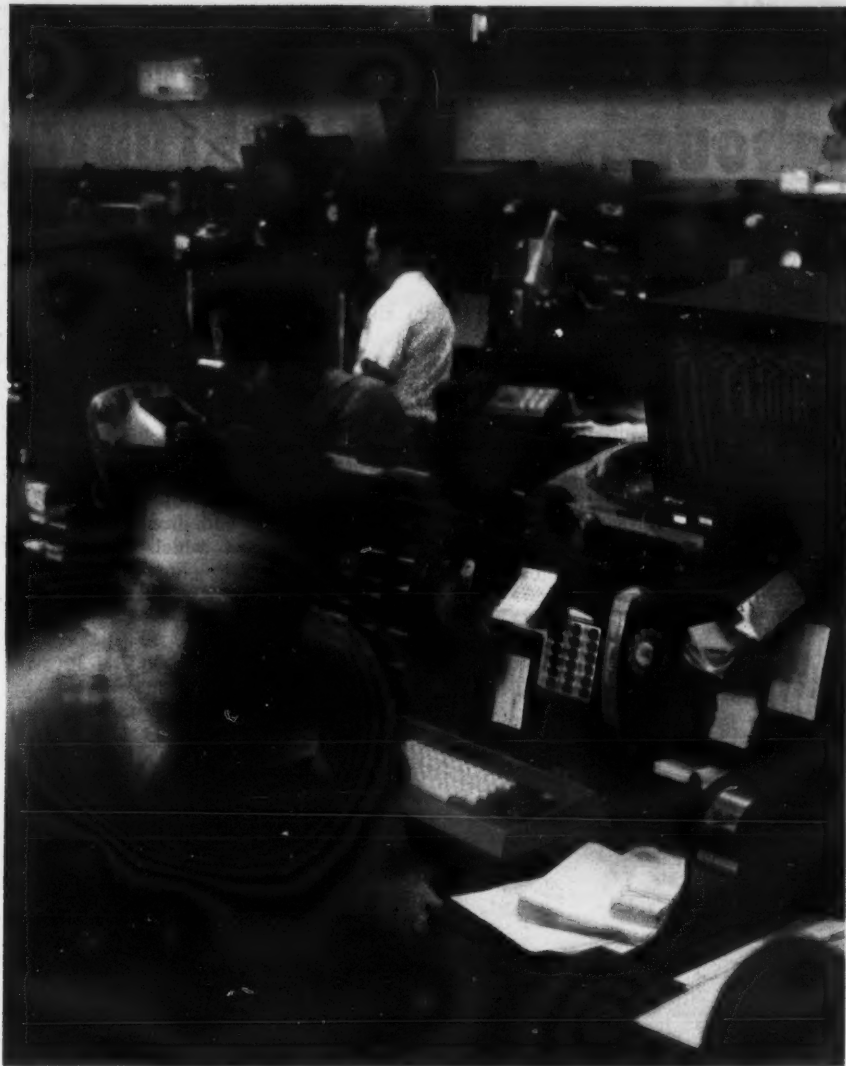
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## Orders & Installations

Baltimore Paint & Chemical Co. has ordered a Sperry Univac 90/60 system for use in handling order entry, production requirements, inventory control and bill of material processing.

The First National Bank of Des Plaines, Ill., has purchased a Burroughs B2700 system valued at \$400,000 to increase the range of DP services within the bank.

The Valley Publishing Co. of Kent, Wash., has installed ECRM, Inc.'s Model 5100 optical character recognition system.

The Riverside County Flood Control District in Cupertino, Calif., has ordered an HP-3000 system to replace an IBM 1130. The district will use the Hewlett-Packard system for engineering calculations needed to determine flood routing, channel capacity and other factors related to the design and construction of flood control projects.

Illinois-California Express, a motor freight carrier headquartered in Denver, will receive a 90/60 system from Sperry Univac for billing, administrative messages, payroll processing, general accounting and statistical analysis.

## Expects First Profitable Year

# CCI Rebounds From Bankruptcy

By Marvin Smalheiser  
CW West Coast Bureau

LOS ANGELES — After a financial crisis that put it down and almost out, Computer Communications, Inc. (CCI) has gotten back on its feet and seems about to put some punch in its marketing as well as its profit figures.

The financial crisis last summer led the company into Chapter XI Bankruptcy Act proceedings and into a couple of aborted mergers.

Now, however, management is

reporting a profitable nine months and expects the first profitable year in the eight-year history of the company.

President Raymond E. High said the company expects to have sales of \$5 million for the fiscal year ending June 30 and net income of about \$600,000.

Third-quarter results showed the third consecutive profitable quarter. Nine-month totals were \$3.6 million in revenues and \$416,622 in earnings.

High said the company is still playing it close to the vest but

he feels the picture is continuing to brighten as the company strengthens its position in the market for front-end processors and message switching systems.

High feels the products CCI has for those markets are "still far ahead of their time" and what CCI has to do is to capitalize on them.

### 'Blessed' Market

The main emphasis, he said, is in front-end processing systems, a market which he feels has started to move since IBM "blessed" it with the introduction of its 3704 and 3705.

The market for the systems consists of 30,000 IBM 360s and 370s installed in the U.S. Dr. Ervin K. Dorff, senior vice-president of CCI, said 43% of those machines have teleprocessing capabilities and about 24% have a significant network.

"If we can get 5% of the market, it will mean 350 systems costing from \$100,000 to \$500,000."

CCI has a customer base that includes airline companies, petroleum companies, law enforcement agencies and securities firms.

The systems are built modularly and, according to Dorff, "every installation we have has expanded its network just about twofold with our equipment."

The front-end processor and message switching systems are the result of four years of development, which included design of a special minicomputer and fixed-head disk unit.

The systems have their own core memory and CCI is introducing semiconductor memory.

Dorff said the cost to CCI of producing its own design was "even" with buying it OEM, "except with the benefit of our own design we get the manufacturing characteristics we want."

### Credibility Gap

High said the main hurdle for CCI now is establishing the credibility of its financial status.

"We have to take a conservative approach to expansion. We're not going to jeopardize profitability," he said.

He attributed the ability of the company to bounce back from near disaster conditions last July to the dedication of the employees.

Last July, in the face of a large loss and the failure of two efforts to obtain public funding, the staff was cut from 149 to 78.

Those remaining were told: "CCI can't guarantee a payroll but if you report to work every day and we do make it, we'll see that you are paid for every hour you put in," High said.

For five weeks CCI didn't issue a payroll and of the 78 employees asked to stay 75 remained on the job, many even though they had other job offers, High said.

In the latter part of August, things started to come alive for CCI, first with an agreement in principle for a merger and then with a first quarter profit of \$101,000.

In February, CCI was discharged from Chapter XI bankruptcy proceedings and its profitability continued.



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For additional details on RT-11 performance, write Digital Equipment Corporation, Maynard, Mass. 01754 (617) 897-5111, Ext. 2083. European headquarters: 81, route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada Ltd., P.O. Box 11500, Ottawa, Ontario K2H 8K8. (613) 592-5111.

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## Prior Warning Can Mitigate Blackout Harm

LOS ANGELES — Harmful effects of rolling blackouts on computer firms can be mitigated if sufficient advance warning is given to high technology firms affected, according to a survey by the Western Electronics Manufacturers Association.

The California Public Utilities Commission is considering three forms of energy saving measures: rolling sequential blackouts, cutbacks to 10% below 1972 levels or cuts to 10% under 1973 consumption.

With no advance notice of a rolling blackout, the 155 manufacturers surveyed indicated each blackout would cost between \$2.8 and \$3.5 million in equipment damage and an estimated \$26.5 million of lost work in process.

However, if firms received at least three hours notice, losses would be reduced to \$1.5 million in equipment damage and \$21.8 million of work in process for each blackout.

With 24 hours advance notice, most firms indicated these losses could be reduced considerably or possibly eliminated.

Cutbacks to 10% below 1972 energy consumption could result in layoffs of 12.4% of present employment, or about 62,000 workers, the survey showed.

However, if cutbacks were based on 10% of the 1973 rate, employment would be reduced by 4.5% or by 22,500 jobs, the survey noted.

Northern New Jersey Service Bureau with 360-30 billing approximately 600,000 break-even interested in merger with similar company for economies in hardware, etc.

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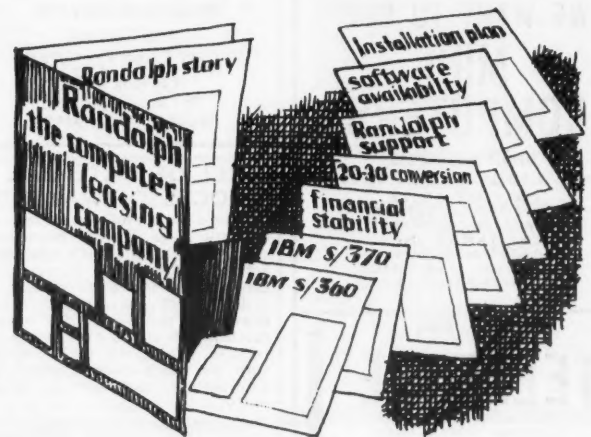
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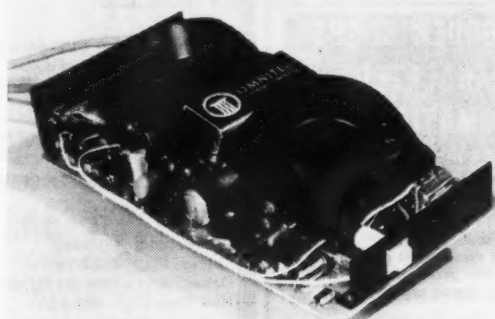
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**With 20% Revenue****Dataproducts Triples Year-End Earnings**

WOODLAND HILLS, Calif. — Earnings more than tripled on a 28% rise in revenues in the year ended March 30 for Dataproducts Corp., supplier of line printers and core memories to the minicomputer and terminal markets.

"Based on our expanding backlog of orders, we anticipate an increase in both earnings and revenues of approximately 25% in the current fiscal year," said President Graham Tyson.

Line printers accounted for 50% of the firm's revenues, which reached \$76.3 million compared with \$59.8 million a year earlier.

Earnings totaled \$7.4 million or \$1.09 a share compared with \$2.3 million or 34 cents a share in the same 1973 period.

Income before tax credits also tripled, to \$4.7 million or 70 cents a share compared with \$1.5 million or 22 cents a share

in income the previous year.

The backlog of firm orders rose to \$42.3 million, up 24% from \$34.1 million a year earlier. This does not include several long-term contracts which approximately equal the value of the reported backlog, the firm said.

Dataproducts managed to reduce its debt by \$7.6 million, leaving a total debt of \$20.7 million. Two thirds of this is in long term debentures bearing 5-3/4% interest, and only one fourth is tied to prime interest rate, the firm said.

**Modcomp Reports Record Earnings; SEL Boosts Third-Quarter Results**

FORT LAUDERDALE, Fla. — Two minimakers based here, Modular Computer Systems (Modcomp) and Systems Engineering Laboratories, Inc. (SEL), reported mixed results for the quarter ended March 29.

Modcomp started off its fiscal year with record sales and earnings in the first quarter.

Revenues rose to nearly \$5 million from \$2.2 million in the year-ago period.

Earnings totaled \$591,000 or 21 cents a share compared with \$252,000 or 12 cents a share in the same period last year.

At SEL, a credit of \$1.3 million from the sale of land boosted third-quarter results into the earnings column, for a total net income of \$1.2 million or 47 cents a share compared with earnings of \$231,999 or 10 cents a share in the 1973 period.

Quarterly revenues declined to \$4.2 million from \$4.5 million a year ago.

Earnings during the third quarter were not enough, however, to counter the losses of the six months, and the firm showed a nine-month loss of \$3.6 million or \$1.38 a share compared with earnings of \$771,389 or 30 cents a share in the same 1973 period.

Revenues for the nine months also declined, to \$10.1 million from \$12.1 million.

President A.G. Randolph said operating performance had been substantially improved and losses reduced concurrent with increased investment in new product development and high interest expenses.

**I/O Devices Meeting Set**

MOUNTAIN LAKES, N.J. — I/O Devices, Inc. will hold a special meeting of shareholders on June 28 to vote upon resolutions to approve and ratify agreements entered into by the company for the sale of substantially all of the company's property and assets.

At the last special meeting of shareholders, the firm indicated its liabilities exceed the estimated market value of its property and assets.

The proceeds from the proposed sale of assets are to be used to pay undisputed claims of the company's trade creditors.

**Sycor Ups 1st-Quarter Figures**

ANN ARBOR, Mich. — Sycor, Inc. boosted its first-quarter results from those of the year-ago period with earnings of \$853,000 or 31 cents a share.

In the restated 1973 period, the firm showed an income of \$772,100 before a charge of \$2.1 million from a change in accounting to the operating method, which resulted in a loss of \$1.3 million or 44 cents a share.

Revenues climbed to \$9.3 million from \$6 million in the year-ago period.

The first-quarter results reflect the firm's strategy to "strengthen its position in the market for

remote communications devices," observed President Samuel N. Irwin.

**Future in Mind**

"While our revenue base has grown substantially over recent periods, we have been applying the company's resources to build for the future. For example, our direct marketing force is nearly twice as large as a year ago, and our product range has been broadened . . ." he said.

Sycor is now in the start-up stage of manufacturing for the flexible disk and matrix printer, he added.

**Conversion Costs Hurt Keydata Net**

WATERTOWN, Mass. — Third-quarter earnings failed to keep pace with the 24% rise in revenues at Keydata Corp., due to costs of conversion to faster terminals for customers and establishment of a customer service center, the firm said.

Revenues rose to \$3 million from \$2.4 million in the year-ago quarter ended April 30, while earnings declined to \$178,000 or 6 cents a share from \$227,000 or 8 cents a share in the year-ago period.

Income from operations before terminal conversion costs was \$302,000 compared with \$259,000 a year ago.

President John T. Gilmore Jr. said the firm believes the "conversion and the gains provided

by our new customer service center will contribute to the long-term profitability and growth of Keydata, more than compensating for their short-term effect on the company's traditional quarter-by-quarter progression."

In the nine months, earnings progressed slightly to \$605,000 or 22 cents from \$604,000 or 21 cents a share in the 1973 period.

Revenues reached \$8.8 million from \$6.9 million in the year-ago period.

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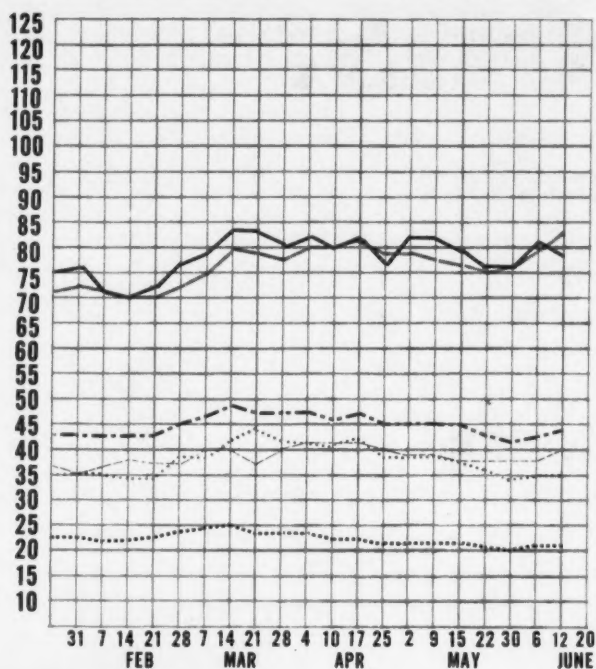


## Earnings Reports

ELECTRONIC DATA SYSTEMS			TECHNICAL TAPE			INTERDATA		
Three Months Ended March 31			Three Months Ended March 30			Three Months Ended March 29		
	1974	1973		1974	1973		1974	1973
Shr Ernd	\$.33	\$.33	aShr Ernd	\$.10	\$.08	Shr Ernd	\$.22	\$.13
Revenue	28,679,992	28,293,452	Revenue	12,408,000	10,420,000	Revenue	6,657,300	3,829,600
Earnings	3,690,373	3,947,472	Tax Cred	182,000	150,000	Tax Cred	a24,400	5,100
9 Mo Shr	1.01	.90	Earnings	379,000	312,000	Earnings	470,300	272,500
Revenue	86,577,974	81,821,644	a-Fully diluted.			a-From foreign loss carryforward.		
Earnings	12,082,950	10,712,430	COMPUTER EQUIPMENT			REDACTORN		
NATIONAL COMPUTER SYSTEMS			Three Months Ended March 30			Three Months Ended March 31		
Year Ended Jan. 31				1974	1973		1974	1973
Shr Ernd	1974	1973	Shr Ernd	\$.08	\$.09	Shr Ernd	\$.24	\$.14
Revenue	5,955,700	5,027,100	Revenue	8,337,000	6,213,000	Revenue	4,515,723	3,082,522
Tax Cred	34,700	253,100	Spec Cred	.....	a50,000	aTax Cred	137,000	86,716
Earnings	327,000	496,300	Earnings	193,000	211,000	Earnings	274,516	176,947
			a-From tax-loss carryforward..					

## COMPUTERWORLD Computer Stocks Trading Indexes

— Computer Systems  
 ..... Peripherals & Subsystems  
 — Supplies & Accessories  
 — Software & EDP Services  
 ..... Leasing Companies  
 — CW Composite Index



SPERRY RAND		
Year Ended March 31		
	1974 (000)	1973 (000)
Shr Ernd	\$3.27	\$2.62
Revenue	2,613,486	2,229,253
Earnings	112,558	90,057
3 Mo Shr	.98	.85
Revenue	724,439	635,015
Earnings	33,852	29,232

COMPU-DYNE		
Three Months Ended March 31		
	1974	1973
Shr Ernd	\$ .02	\$ .03
Revenue	7,396,533	6,284,428
Earnings	112,780	141,561
6 Mo Shr	.04	.06
Revenue	14,473,695	13,503,062
Tax Cred	.....	68,000
Earnings	232,995	309,075

NUCLEAR DATA			
Year Ended Feb. 28			
	1974	1973	
Shr Ernd	\$1.05	.....	
aRevenue	18,960,883	14,065,093	
Disc Op	.....	(2,620,064)	
Tax Cred	326,000	.....	
Earnings	913,009	(4,109,602)	
a-From continuing operations.			

CODEX		
Three Months Ended March 31		
	1974	1973
Shr Ernd	\$ .71	\$ .31
Revenue	3,929,000	1,715,000
Tax Cred	496,000	214,000
Earnings	1,034,000	460,000
6 Mo Shr	1.27	.57
Revenue	7,156,000	3,073,000
Tax Cred	882,000	391,000
Earnings	1,852,000	829,000

## Computerworld Stock Trading Summary

All statistics compiled,  
computed and formatted by  
**TRADE★QUOTES, INC.**  
Cambridge, Mass. 02139

F X C H		PRICE			
		1973-74	CLOSE	WEEK	WEEK
		RANGE (1)	JUN 12 1974	NET CHNGE	PCT CHNGE
COMPUTER SYSTEMS					
N	HUPPDRIGHS CORP	49-126	109 1/8	0	0.0
N	COLLINS RADIO	16- 26	24 3/4	0	0.0
O	COMPUTER AUTOMATION	5- 20	12 1/2	-1 1/4	-9.0
N	CONTROL DATA CORP	27- 62	29 7/8	-1 1/8	-3.6
N	DATA GENERAL CORP	24- 49	34 5/8	-1	-2.8
O	DATAPoint CORP	10- 21	12	- 1/4	-2.0
O	DITRAL COM CONTROL	2- 6	3 5/8	- 3/8	-9.3
N	DITCAL EQUIPMENT	73-121	108 1/4	-2 5/8	-2.3
N	ELECTRONIC ASSOC.	2- 9	2 1/4	+ 1/8	+5.4
A	ELECTRONIC ENGINEER.	6- 14	8 3/4	+ 1/8	+1.6
N	ENVPPOD	23- 48	27	-3	-10.0
O	GENERAL AUTOMATION	22- 55	36 3/4	- 1/4	-0.6
O	GRI COMPUTER CORP	1- 3	7/8	- 1/4	-22.2
N	HEWLETT-PACKARD CO	70- 99	89 1/2	+1 1/8	+1.2
N	HEWLETTPACKARD INC	68-139	69	- 1/4	-0.3
N	IBM	211-340	224 3/4	-2 3/4	-1.2
O	INTERDATA INC	7- 22	20 1/8	- 1/8	-0.6
O	MICRONDATA CORP	2- 10	3 7/8	+ 1/4	+6.9
N	NCR	27- 46	34 5/8	-1 3/8	-3.8
N	RAYTHEON CO	22- 39	34 1/2	+1	+2.9
N	SINGED CO	30- 74	32	- 1/4	-0.7
N	SOPRRY RAND	36- 56	41	0	0.0
A	SYSTEMS ENG. LARS	1- 8	1 7/8	0	0.0
N	TEXAS INSTRUMENTS	83-138	93 1/2	-9 3/8	-9.1
O	ULTIMAC SYSTEMS INC	1- 11	1 3/8	- 1/8	-8.3
N	VARIAN ASSOCIATES	9- 20	9	- 1/2	-5.2
N	WARN LARS	13- 34	14	- 1/2	-3.4
N	XEROX CORP	106-169	125 1/4	+1 1/4	+1.0
LEASING COMPANIES					
A	BROTH COMPUTER	1- 5	1 1/8	0	0.0
N	BRENNAN COMP.	1- 2	2 1/8	0	0.0
O	COMISCO INC	2- 17	3	+ 1/4	+9.0
A	COMMERCE GROUP CORP	3- 6	3 7/8	+ 1/8	+3.3
O	COMPUTER EXCHANGE	1- 1	1/8	0	0.0
A	COMPUTER INVSTRS GRP	2- 8	1 3/4	0	0.0
O	COMP. INSTALLATIONS	1- 2	1	0	0.0
N	DATRONIC RENTAL	1- 3	1	0	0.0
A	DCL INC	0- 3	3/8	-	-12.4
N	DPE INC	3- 9	3 3/4	- 1/8	-3.2
O	ENR RESOURCES	1- 3	3 1/4	0	0.0
A	GRANITE MGT	1- 6	1 1/4	0	0.0
A	GRUYHOUND COMPUTER	3- 6	3 1/2	- 1/8	-3.4
A	ITTL	6- 12	4 7/8	+ 1/4	+5.4
N	LFASCO CORP	4- 18	10 1/8	- 1/8	-1.2
O	LFASPC CORP	1- 8	1 1/8	0	0.0
O	LECTRO MGT INC	1- 2	3/8	0	0.0
O	NOR INC	3- 15	3 3/8	- 1/4	-6.8
A	PIONEER TEX CORP	2- 10	3	+ 1/8	+4.3
A	ROCKWOOD COMPUTER	1- 3	3/4	0	0.0
N	U.S. LEASING	12- 36	16 3/8	+1 5/8	+11.0

F X C H		PRICE			
		1973-74 RANGE (1)	CLOSE JUN 12 1974	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1	+ 1/4	+33.3
A	APPLIED DATA RES.	2- 4	2 1/4	0	0.0
O	APPLIED LOGIC	1- 3	1/8	0	0.0
N	AUTOMATIC DATA PROC	29- 94	33 3/4	+1 1/4	+3.8
O	RANDOM APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	3- 9	4 3/4	+ 3/4	+18.7
O	COMPUTER DIMENSIONS	1- 5	2	0	0.0
O	COMPUTER HORIZONS	1- 4	2 1/4	+ 1/4	+12.5
O	COMPUTER NETWORK	1- 5	1 3/8	0	0.0
N	COMPUTER SCIENCES	2- 6	3 1/8	+ 1/4	+8.6
O	COMPUTER TASK GROUP	1- 2	1/2	0	0.0
O	COMPUTER TECHNOLOGY	1- 3	1/2	0	0.0
O	COMPUTER USAGE	3- 9	3 1/2	+ 1/2	+16.6
O	COMRESS	1- 2	1/2	0	0.0
O	COMSHARE	2- 9	3	+ 3/8	+14.2
N	CORDURA CORP	2- 15	3 3/8	+ 1/8	+3.2
O	DATATAR	1- 4	2	0	0.0
A	ELECT COMP PROG	1- 2	1/4	+ 1/8	+100.0
N	ELECTRONIC DATA SYS.	12- 56	16 1/4	- 3/4	-4.4
O	INTERNATIONAL INC	1- 2	1/2	0	0.0
O	I.O.A. DATA CORP	1- 1	3/8	0	0.0
O	IPS COMPUTER MARKET.	2- 5	7/8	+ 1/8	+16.6
O	KFANE ASSOCIATES	2- 5	3 1/2	0	0.0
O	KFYDATA CORP	3- 12	3 1/8	0	0.0
O	LOGICON	2- 7	3 1/4	+ 1/4	+8.3
A	MANAGEMENT DATA	1- 5	1 3/8	0	0.0
O	NATIONAL CSS INC	18- 42	21	-2 1/2	-10.6
O	NATIONAL COMPUTER CO	1- 1	3/8	0	0.0
O	NATIONAL INFO SRVCS	1- 2	1/8	0	0.0
A	ON LINE SYSTEMS INC	12- 31	28 5/8	+ 1/8	+0.4
N	PLANNING RESEARCH	2- 7	2 7/8	+ 1/8	+4.5
O	PROGRAMMING METHODS	17- 25	17	0	0.0
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	2- 24	2 3/4	+ 1/8	+4.7
O	SCIENTIFIC COMPUTERS	1- 3	7/8	0	0.0
O	SIMPLICITY COMPUTER	1- 4	1	0	0.0
O	TCC INC	1- 1	1/4	0	0.0
O	TYMSHARE INC	5- 13	11 3/8	- 1/4	-2.1
O	UNITED DATA CENTER	3- 4	2 3/4	0	0.0
O	URS SYSTEMS	2- 8	2 1/2	0	0.0
N	WELLY CORP	3- 11	3 1/2	- 1/8	-3.8

PERIPHERALS & SUBSYSTEMS					
N	ADDRESSOGRAPH-MULT	6- 34	5 5/8	0	0.0
N	ADVANCED MEMORY SYS	3- 23	3 3/8	0	0.0
N	AMPEX CORP	3- 7	3 5/8	0	0.0
N	ANDERSON JACOBSON	2- 6	2 3/4	+ 1/4	+10.0
N	REFNIVE MEDICAL ELEC	3- 10	3 1/4	0	0.0
N	ROLT, HERANEX & NFW	6- 12	8	0	0.0
N	RUNKER-RAMO	6- 1R	6 3/4	+ 1/4	+3.8
N	CALCOMP	9- 16	9 5/8	- 5/8	-6.0
N	CAMBRIDGE MEMORIES	8- 17	8 3/4	- 3/4	-7.8
N	CENTRONICS DATA COMP	13- 3R	18	-1 3/4	-8.4
N	COREX CORP	8- 19	12	- 1/4	-2.0
N	COGNITRONICS	1- 3	1 1/4	+ 1/8	+11.1

E X C H		PRICE				
		1973-74 RANGE (1)	CLOSE JUN 12 1974	WEEK	WEEK	
				NET CHNGE	PCT CHNGE	
O	COMPUTER COMMUN.	1- 4	5/8	+ 1/8	+25.0	
A	COMPUTER EQUIPMENT	1- 3	1 1/2	0	0.0	
O	COMPUTER MACHINERY	4- 13	3 3/4	- 1/8	-3.2	
O	COMPUTER TRANSCEIVER	1- 6	1 1/4	+ 1/4	+25.0	
N	CONRAC CORP	13- 32	17 5/8	+ 3/4	+4.4	
O	DATA ACCESS SYSTEMS	1- 3	1 7/8	0	0.0	
O	DATA 100	9- 19	10 1/8	+ 1/8	+1.2	
O	DATA PRODUCTS CORP	2- 5	3 5/8	0	0.0	
O	DATA RECOGNITION	1- 3	1 1/4	0	0.0	
O	DATA TECHNOLOGY	1- 5	3 1/8	+ 1/4	+8.6	
O	DECISION DATA COMPUT	6- 40	6 3/8	-1 1/8	-15.0	
O	DELTA DATA SYSTEMS	1- 1	3/4	+ 1/8	+20.0	
O	DIZAN CONTROLS	1- 4	1 1/2	- 1/4	-33.3	
N	ELECTRONIC M & M	3- 6	2 5/8	0	0.0	
O	FARRI-TEK	2- 5	2 1/8	- 1/4	-10.5	
O	GENERAL COMPUTER SYS	2- 9	2	0	0.0	
N	GENERAL ELECTRIC	4R- 76	50 1/2	+1	+2.0	
N	HAZELTINE CORP	4- 9	4 5/8	0	0.0	
O	INFOREX INC	2- 23	2 1/8	- 1/8	-5.5	
O	INFORMATION DISPLAYS	1- 2	1/4	0	0.0	
A	INFORMATION INTL INC	4- 15	11	- 1/4	-2.2	
A	LUNDY ELECTRONICS	3- 9	2 7/8	0	0.0	
O	MANAGEMENT ASSIST	1- 1	1/4	0	0.0	
N	MEMOREX	2- 10	4 1/4	+ 3/8	+9.6	
A	MILGO ELECTRONICS	9- 28	11	-1 3/8	-11.1	
N	MOHAWK DATA SCI	2- 13	2 3/8	- 3/8	-13.6	
O	ODEC COMPUTER SYST.	2- 6	2	+ 1/4	+14.2	
O	OPTICAL SCANNING	2- 8	5 1/4	0	0.0	
O	PERTEC CORP	3- 8	2 3/4	- 1/8	-4.3	
O	PHOTON	3- 7	3 3/4	0	0.0	
A	POTTER INSTRUMENT	2- 9	3 1/8	+ 1/8	+4.1	
O	PRECISION INST.	2- 6	1 1/4	+ 1/4	+25.0	
O	QUANTOR CORP	4- 10	4 1/2	- 1/2	-10.0	
O	RECOGNITION EQUIP	2- 8	3 1/4	- 1/8	-3.7	
N	SANDERS ASSOCIATES	4- 18	4 3/8	0	0.0	
O	SCAN DATA	1- 3	1 1/2	0	0.0	
O	SECORGE TECHNOLOGY	11- 36	12 1/2	- 1/2	-3.9	
O	SYCOR INC	7- 20	8 1/2	+ 1/2	+6.2	
O	TALLY CORP.	2- 14	3 1/8	+ 1/8	+4.1	
O	TFC INC	4- 9	4 1/4	0	0.0	
N	TEKTRONIX INC	30- 55	41 5/8	+ 1/8	+0.3	
N	TELEFX	3- 8	2 3/4	- 1/4	-8.3	
O	WANGCO INC	7- 13	10	+ 1/8	+1.2	
O	WILTEK INC	5- 18	5 1/8	- 3/8	-6.0	

SUPPLIES & ACCESSORIES						
O	BALTIMORE BUS FORMS	4-	9	5 1/4	0	0.0
A	BARRY WRIGHT	5-	13	5 3/4	0	0.0
A	CYBERMATICS INC	1-	3	1 1/4	+ 1/8	+11.1
A	DATA DOCUMENTS	17-	50	49	+5 1/8	+11.6
A	DUPLEX PRODUCTS INC	4-	16	16	+2 1/2	+18.5
N	FNNIS BUS. FORMS	5-	8	6 7/8	+ 3/8	+5.7
A	GRAHAM MAGNETICS	7-	20	8	0	0.0
A	GRAPHIC CONTROLS	7-	12	9 3/4	+ 1/4	+2.6
A	3M COMPANY	60-	91	77 5/8	+2 3/8	+3.1
A	MOORE CORP LTD	44-	65	53 1/4	+ 1/2	+0.9
A	NASHUA CORP	32-	58	39 1/4	+2	+5.3
A	PFYNOLDS & REYNOLD	23-	51	24 1/2	0	0.0
A	STANDARD REGISTER	11-	20	14 3/4	0	0.0
A	TAR PRODUCTS CO	6-	23	6 1/4	0	0.0
A	USARCO	15-	23	22	- 1/8	-0.5
A	WARASH MAGNETICS	5-	8	5 1/2	+ 1/8	+2.3
A	WALLACE BUS FORMS	14-	26	23 1/4	+2 1/2	+12.0

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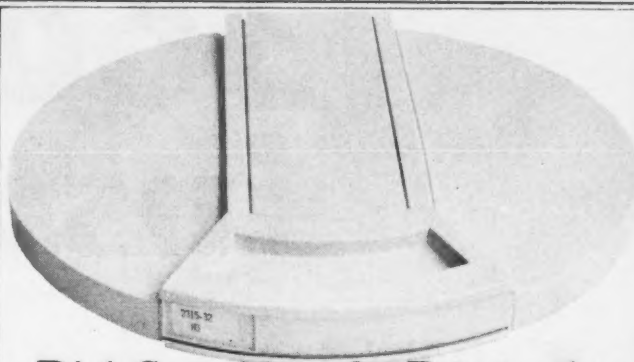
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CIG, with its Data Recall product, was the first company in the industry to offer 360 independent memory. We went on from there. Improving on our improvements. Today, CIG is the world's leading independent memory supplier with sales, service and systems engineering support available throughout the United States, Canada and Europe.

## 5 DELIVERY

CIG 360 memory is available for any computer. Anywhere in the U.S. In 30 days or less. No ifs, ands, or buts.

## 6 SERVICE

We don't sell you 360 memory and walk away from you. We service you like you've never been serviced before. For one thing, we back-stop all our sales reps with our own CIG-trained specialists in every state of the Union. So if you need them, they're right there where you want them.

## CIG. MORE THAN JUST MEMORY.

We're big in 360/370 leasing, too. We can design and deliver a complete hardware/financial package that'll give you CPU, memory, peripherals, and save you a small fortune, to boot.

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### **CIG** **CIG COMPUTER PRODUCTS, INC.**

A Subsidiary of Computer Investors Group, Inc.  
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☐ I'd like to check your prices. Have your rep call me at \_\_\_\_\_

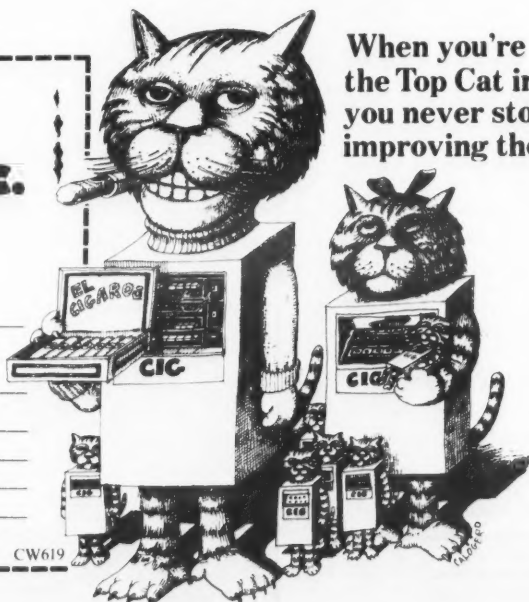
☐ Send info on other CIG Memory for the 360/\_\_\_\_\_, 370/\_\_\_\_\_

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